The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Entered as second-class matter, July 2, 1907, at the Chicago, Illinois, Postoffice, under the Act of March 3, 1879

CLINTON S. DARLING, Editor
CHARLES A. BRESKIN, Adv. Mgr.
E. M. GIBSON, Asst. Mgr.
N. C. ROCKWOOD, Advisory Editor
H. E. HOPKINS, Associate Editor
C. H. FULLER, Mgr. New York Office
GEO. P. MILLER, Manager

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MEMBER A. B. C. MEMBER A. B. P.

W. D. CALLENDER, President
N. C. ROCKWOOD, Vice-President
GEO. P. MILLER, Treasurer
C. O. NELSON, Secretary

Volume 25 May 20, 1922 Number 10

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Quarried from Life....40
Editorial....41
News....42, 43, 44
New Machinery and Equipment....45
Rock Products Market....46, 47, 48, 49
News of All the Industry....50

The Stamp of Approval

At a recent meeting of producers in one of the rock producing industries, Oliver Bowles of the U. S. Bureau of Mines presided. During the course of the meeting he had occasion to refer to periodicals of the industry. Here is what he said:

"We in the Bureau of Mines regard ROCK PRODUCTS of Chicago as the leading periodical devoted to the interests of non-metallic minerals, and we have noted a growing improvement in its pages."

This is in concrete form what thousands of producers, as well as government and association officials, believe about ROCK PRODUCTS. It is the leading periodical in its field.

*

Make It a Permanent Help

Most articles in ROCK PRODUCTS are of more than passing value. That is why so many readers carefully save each issue and have them bound at the end of each six months or year.

It's the only safe way, because complete files of back issues cannot be maintained at the office to supply all demands, and dozens of requests for copies of the magazine one, two, three, and four years old have to be turned down each week. It is unfortunate but true, so if you aren't already doing it you had better start saving the issues for bound volumes. Then when you want to see the article on the Smith plant, or on the best methods of storing, that you recall having seen several months before, you'll have it in your file and possibly save yourself the disappointment of a reply "No more in stock" to your request for an extra copy.

Rock Products' Friends!

THE impression seems to prevail that I have severed my connection with ROCK PRODUCTS, or lost interest in the field. Quite the contrary is true. While business exigencies demand that I give a share of my time to our other paper—NATIONAL BUILDER—I love the rock products field too well and see its opportunities too clearly to want to disassociate myself from it, or from the many friends I have made in that field.

My new work brings me in intimate contact with architects, engineers and builders—men who are everyday users of rock-product building materials—and I feel assured that these new associations will be of much value to me in helping to shape the editorial policy of ROCK PRODUCTS. In the meantime I shall use every effort to keep alive my contacts with rock products producers as well.

NATHAN C. ROCKWOOD

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NATHAN C. ROCKWOOD

PHOENIX PORTLAND CEMENT CO.

REAL ESTATE TRUST BUILDING

PHILADELPHIA

January 27th, 1922

Marion Steam Shovel Company,
Marion, Ohio.

Gentlemen:

It is a real pleasure to write you regarding the very satisfactory service that our Model #36 Caterpillar Marion Shovel has been giving us. The Caterpillar feature is particularly advantageous as it saves time and labor, both of which mean money.

The repairs and maintenance have been very reasonable and general operation has been entirely satisfactory.

When we buy another shovel it will undoubtedly be another Marion "36".

Yours very truly,

Lindley C. Morton,
Vice-President and General Manager

LCM.MCL.

What they say about MARION

***F. O. Earnshaw*, superintendent of the Carbon Limestone Co., Hillsville, Pa., says:**

"We have been operating a Marion Model 31 Shovel for some time and are pleased to say that it has given us very good satisfaction.

"It is very handy, to get up and down steep grades and has done good work in coal and shale without shooting same. Also, good work in stripping dirt in places where a larger shovel could not be used to good advantage."

THE **Marion** STEAM SHOVEL CO.

Established 1884 **Marion, Ohio**

New York Chicago Atlanta San Francisco

Portland—Clyde Equipment Co.
Salt Lake City—H. W. Moore & Co.
Seattle—Clyde Equipment Co.
Spokane—Clyde Equipment Co.
Billings, Mont.—Connelly Mchy. Co.
Dallas—F. B. Wright, Busch Bldg.
Denver—H. W. Moore & Co.
Vancouver—Vancouver Machinery Depot, Ltd.
Montreal, Toronto—F. H. Hopkins & Co., Ltd.
Detroit, Mich.—W. H. Anderson T. & S. Co.
New Orleans, La.—C. H. Stem, 518 Conti St.
Philadelphia—H. L. Cox, 13th & Cherry St.
Pittsburgh—J. W. Patterson

EVERYWHERE RELIABLE — THE Marion STEAM SHOVEL CO. — ESTABLISHED 1884

National Stone Co., Joliet, Ill. Shot with Grasselli Explosives

"Give me the good old standby!"

Ask the old timer. He knows. He knows from experience how to make reasonably sure of his blasting *before* the shot.

He uses the old reliable nitro-glycerin, gelatin or ammonia dynamites because these are explosives that have *proved* their actual worth.

Blasting that leaves the face clean, ready for the next shot, with no dangerous overhang, no toe or big boulders to be re-blasted—that's real shooting.

You want good powder for that work, yes, and you need good accessories, too. Use Grasselli Accessories with Grasselli Explosives and be sure of getting what you want, the *first* shot.

The Grasselli Powder Company

Main Office, Cleveland, Ohio

Philadelphia, Pa.
Pittsburgh, Pa.
Chicago, Ill.
Birmingham, Ala.

ESTABLISHED 1839 CHEMICALS ZINC GRASSELLI EXPLOSIVES DYESTUFFS

Wilkes-Barre, Pa.
Pottsville, Pa.
Uniontown, Pa.
Bluefield, W. Va.

GRASSELLI EXPLOSIVES

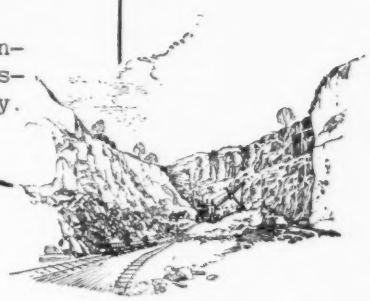
1/3 more per dollar

Excerpt from a letter written by a large user of Dumorite for quarry operations

Some of the original, experimental Dumorite was shot at our quarry last November. The results of these shots were very good and justified further trial. Therefore, as soon as this new explosive was placed on the market we started using it.

The results from Dumorite continue to be economical and very satisfactory. We have found that we use less of this explosive than of that previously used at a reduced explosive cost per ton rock quarried.

Our men like the non-headache and non-freezing features. It is a very satisfactory explosive for use in our quarry.



DUMORITE *Has Proved Itself*

IT went out proved in our laboratories, proved in our experimental field tests and ready for the verdict of the men who actually do the work.

The above excerpt from one of many letters we have received is definite testimony that Dumorite has made good on the job.

Dumorite, the newest Du Pont Explosive, has approximately the same strength, stick for stick, as regular 40% dynamite. But a case of Dumorite contains 35 to 40 more sticks than a case of "40%" and sells for the same price. Write our nearest branch for full information.

E. I. du Pont de Nemours & Co., Inc.

Explosives Department

Wilmington, Delaware

Branch Offices:

Birmingham	Ala.	Duluth	Minn.
Boston	Mass.	Huntington	W. Va.
Buffalo	N. Y.	Kansas City	Mo.
Chicago	Ill.	New York	N. Y.
Denver	Colo.	Pittsburgh	Pa.

Branch Offices:

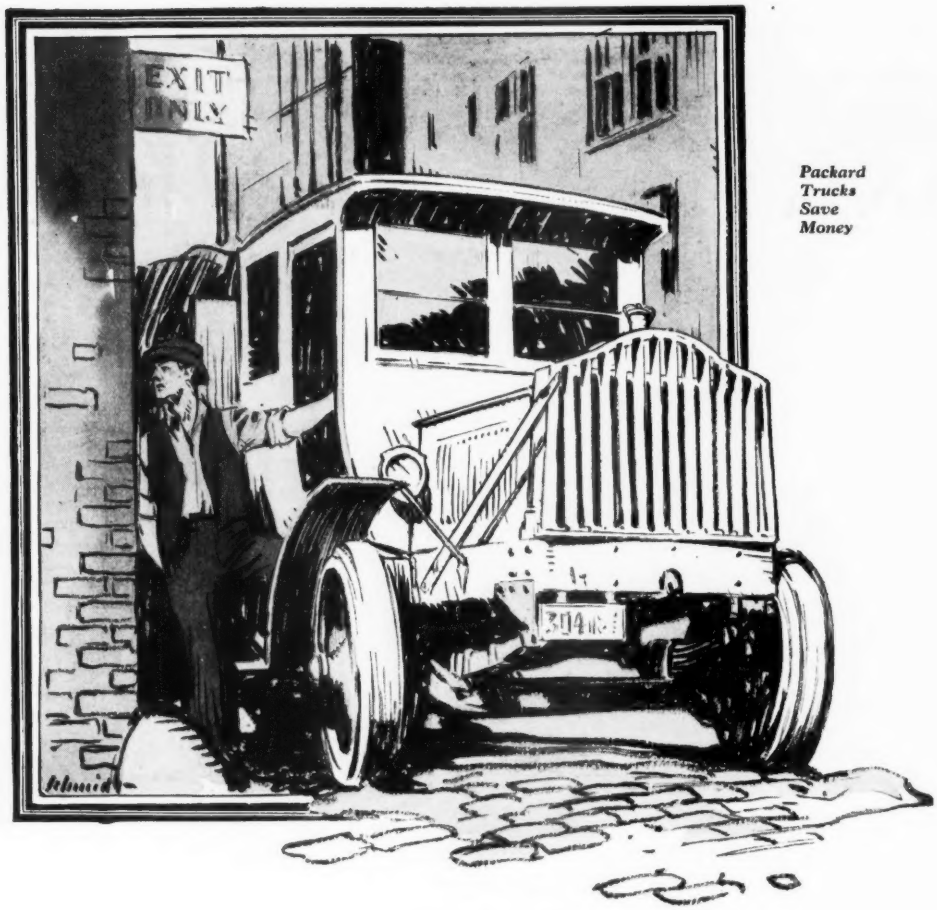
Portland	Ore.	San Francisco	Calif.
St. Louis	Mo.	Scranton	Pa.
Springfield	Ill.	Seattle	Wash.
		Spokane	Wash.

Du Pont Products Exhibit, Atlantic City, N. J.

NON-HEADACHE DU PONT NON-FREEZING

DUMORITE

THE LATEST OF A COMPLETE LINE OF DU PONT EXPLOSIVES



Packard Trucks Save Money

It is perfectly plain that the Packard Truck never could have attained outstanding leadership were it not a sound, saving investment, from every viewpoint of truck operation.

The comparatively low purchase price of Packard Trucks—generally lower than prices of other trucks of comparable quality—adds great emphasis to Packard value.

The seasoned and stable organization building the Packard Truck will continue to advance and fortify still further its leadership and its reputation for lower-cost haulage.

ASK THE MAN WHO OWNS ONE

Packard Service

In 585 cities and towns throughout the United States, Packard Truck Service Stations give owners highly skilled service at a reasonable cost. Packard Truck costs, always low because sound, Packard construction minimizes need of repair, are held still lower by this expert, broadcast service.

Packard Trucks range in capacity from 2 tons, to 7½ tons; and in price from $3,100 to $4,500

PACKARD MOTOR CAR COMPANY, DETROIT

PACKARD TRUCKS

NON-METALLIC MINERALS

Cement Problems—

1—Quarrying, mining and transportation of raw materials.

2—Proper mixture of raw materials, with a view of maintaining proper and intimate relation of ingredients throughout the burning process.

3—Non-fluctuating, dependable and properly applied heat in kilns with greatest fuel economy.

4—Proper machinery, and proper co-ordination of units for the best milling of the clinker.

5—Storage facilities; bag handling department; economical loading in the carriers.

The portland cement industry is fundamentally a chemical process based on the utilization of non-metallic minerals of varying composition in different localities, and of great physical differences.

***Basically,* burning cement clinker is *Ceramics*—heat treating and fluxing of materials; therefore a concern having the greatest experience in *Ceramics,* is vitally essential in the development of a cement plant.**

Due to fluctuation in the composition of raw materials as taken from the pit or mine, it is necessary to work on a ceramic and chemical basis; rectifying unforeseen conditions in the mixture.

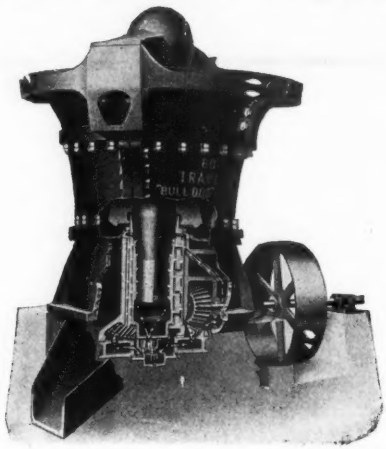
Variations in stratification of the component minerals, and other constantly changing and often unforeseen elements, calls for a high degree of chemical knowledge.

To completely co-ordinate a plant the whole operation must be visualized from the combined standpoint of the mining, chemical, mechanical, ceramic, and industrial engineer; and it is here the Waller Crow Organization can help you in the successful development of your property, because of their wide practical experience, skill, and technical qualifications.

WALLER CROW, INC.
Engineers
COUNSELLORS IN INDUSTRIAL OPERATION & FINANCE
327 S. LA SALLE STREET ▫▫ CHICAGO

ENDURINGLY EFFICIENT

TRAYLOR
BULLDOG GYRATORY CRUSHER



STUDY THIS PHOTOGRAPH CLOSELY!

Note the premier Force Feed Oiling System which guarantees adequate lubrication of every moving part.

Observe how finely finished are the "Works" of this machine—Literally "Built Like a Watch."

THE GYRATORY WITH

The Bend-Proof Shaft
Cast Steel Gears with Cut Teeth
Self-Aligning Eccentric Bearing
The Hewes Non-Weaving Spider

THE BULLDOG

Operates Continuously
Produces at Full Capacity
Uses Power Sparingly
Only Rarely Needs Repairing

IS IT SURPRISING THAT USERS ARE ENTHUSIASTIC?

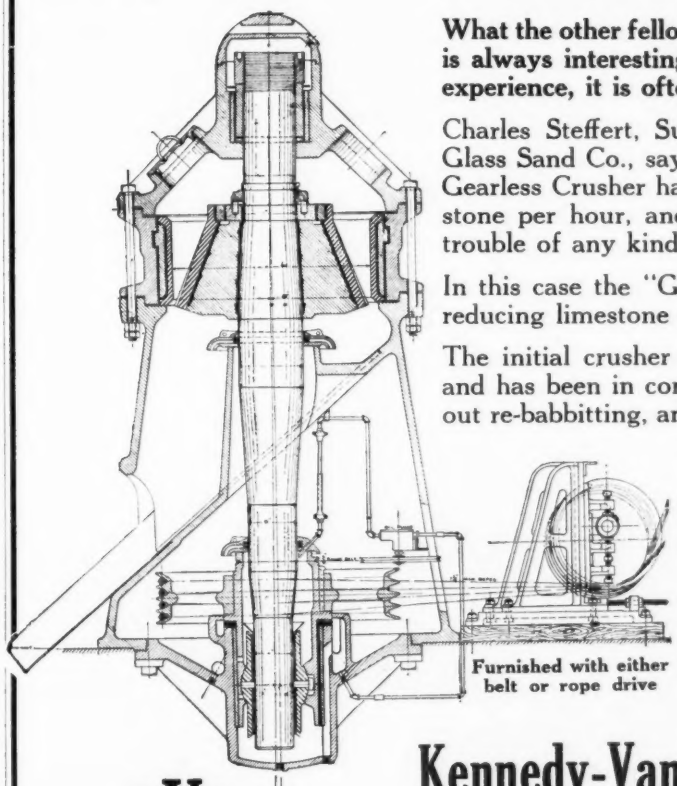
BULLETIN GX1-R—YOURS FOR THE ASKING—GIVES FULL SPECIFICATIONS

TRAYLOR ENGINEERING AND MANUFACTURING COMPANY
ALLENTOWN, PA.

NEW YORK 30 Church Street
PITTSBURGH 1133 Fulton Bldg.
CHICAGO 1414 Fisher Bldg.
LOS ANGELES Citizens Nat'l Bank Bldg.
SPOKANE 616 Mohawk Bldg.
BIRMINGHAM Brown-Marx Bldg.
NEW ORLEANS 1215 New Hibernia Bank Bldg.
SALT LAKE CITY Dooly Bldg.
TRUCK AND TRACTOR DIVISION CORNWELLS, PA.
EXPORT DEPARTMENT 104 PEARL ST., NEW YORK CITY

KENNEDY Gearless Crusher

At quarry of Toledo Stone & Glass Sand Co.



Furnished with either belt or rope drive

What the other fellow thinks about the equipment he is using is always interesting, and if we are willing to profit by his experience, it is often times valuable.

Charles Steffert, Superintendent of the Toledo Stone and Glass Sand Co., says that during the two years this No. 37 Gearless Crusher has been in use, it has handled 75 tons of stone per hour, and has operated without re-babbitting or trouble of any kind.

In this case the "Gearless" is used for secondary crushing, reducing limestone to ¾-in. or lower.

The initial crusher is also a Kennedy, a No. 42 gyratory, and has been in continuous operation for seven years without re-babbitting, and has otherwise demonstrated its service satisfaction in a plant where the capacity is 60 carloads of stone per day.

The results obtained at the Toledo plant can be duplicated anywhere and we would like to send you particulars, or our engineers are at your service to help solve your crushing problem.

Specify KVS Products

Kennedy-Van Saun Mfg. & Eng. Corp.

120 Broadway, New York **40 Rue des Mathurins, Paris**

SHOPE BULLETIN

VOL. I May 20, 1922 Number 19

The Proof—

If you are thinking of making cement bricks, and it is logical as a producer of sand, gravel, or crushed stone that you should, be sure to make nothing but the best.

Entirely aside from our personal opinion on the subject, we have convincing proof that cement brick, manufactured by Shope Machinery, and under the Shope Patented Process, is superior in every way to any other brick, either cement or clay.

At a recent fire test made by the University of Arizona, at Phoenix, Shope Cement Bricks were subjected to 2500 degrees of heat; water was applied at the greatest heat, and ***not a single brick cracked or peeled.***

Waterproof tests were then made in the laboratories, and Shope Bricks were kept in water for five days at a pressure head of 80 ft., and the report pronounced these bricks to be absolutely waterproof under this pressure, while the coloring showed no appreciable change.

Think of this as a talking point to Architects and Builders when you are looking for business, and don't forget, our licensees are protected; there can be no competition in your territory.

It will pay you to investigate our proposition

Shope Brick Company

361 East Morrison Street **Portland, Oregon**

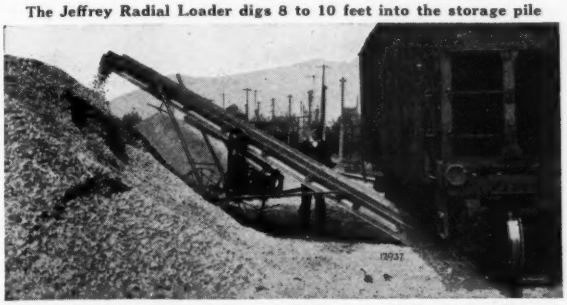
LICENSEES:

The Miles Co.---Salem, Ore.
Eugene Concrete Co.---Eugene, Ore.
Wastenburg Brick Co.---Klamath Falls, Ore
Arizona Shope Concrete Brick Co.---Phoenix, Ariz.
Florida Nu-Tex Brick Co.---109 Water St., Tampa, Fla.
Texas Shope Brick Co.---3056 Sumpter Bldg., Dallas, Tex.
Birmingham Slag Co.---Birmingham, Ala.
Shope Brick Co. of Wisconsin---50th and State Sts., Milwaukee, Wis.
The Polychrome Cement Brick & Tile Co.---Carter-Cotton Bldg., Vancouver, B. C.
Dark Canyon Stone Co., H. W. Jones, Mgr., Rapid City, S. D.
Warren Sand & Gravel Co.---Easton, Pa.
Penn Shope Brick Co.---Reading, Pa.
Lycoming Shope Brick Co.---Williamsport, Pa.
Shope Brick Co.---Portland, Ore.
Rustic Brick & Supply Co., Palette Rd., Ford City, Ont., Can.
Puyallup Shope Brick Co.---Puyallup, Wash.
The Shope Brick Co.---Springfield, Mass.
Utah Shope Brick Co., P. O. Box 632, Salt Lake City, Utah
Decoration Brick Co.---1565 N. Lake Ave., Seattle, Wash.

These licensees are all successful manufacturers

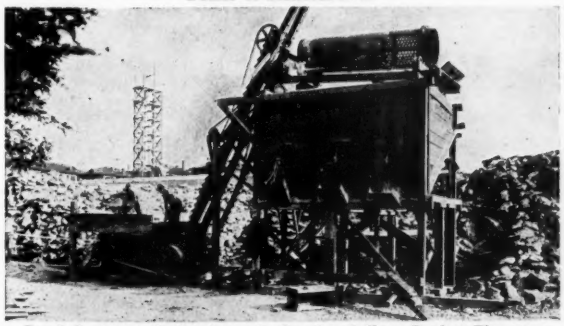
Type G Radial Loader handling sand

The Jeffrey Radial Loader digs 8 to 10 feet into the storage pile



Jeffrey Portable Belt Conveyer unloading gravel direct from hopper bottom car. Used for handling Sand, Gravel, Stone, Coal, etc.

The Jeffrey Portable Belt Conveyer is a light and inexpensive machine which meets the requirements of the Contractor, Coal Dealer or Manufacturer



Road Contractor's Equipment, showing Jeffrey Bucket Elevator handling stone from crusher to revolving screen

How Can We Cut Rehandling Costs?

With the keenest competition that the road building field has ever known, the question of cutting operating costs is a serious matter.

Idle trucks and laborers are expensive—eat up profits—you cannot afford to keep them waiting a minute more than is absolutely necessary—and loading loose materials by hand means long, expensive waits that cannot be tolerated by the busy contractor.

Isn't it reasonable to assume that a Jeffrey Radial Loader, which with the aid of only one man will load a 5-Ton Truck in 5 minutes, is cheaper than using 3 hand shovelers 25 minutes to do the same work?

Jeffrey Portable Belt Conveyers, Continuous Bucket Elevators, Swing Hammer Pulverizers, Electric Industrial Locomotives, etc., also play a big part in helping Road Contractors and others to keep material handling costs down to rock bottom.

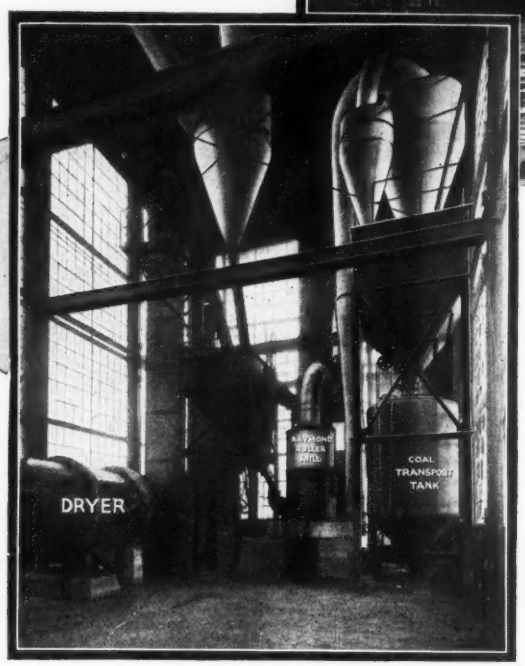
Let our experienced Engineers prescribe the remedy for your material handling conditions. Their co-operation involves no obligation on your part.

The Jeffrey Mfg. Co.

935-99 North Fourth Street, Columbus, Ohio

JEFFREY

MATERIAL HANDLING MACHINERY



A Raymond Powdered Coal Plant—Clean—Efficient—Dustless and Automatic in Operation

Two More Cement Plants Have Found From Experience That Raymond Roller Mills Grind Their Coal Economically

One has replaced tube mills with Raymond Roller Mills reducing, very materially, their power and repairs and producing a more uniform coal which has enabled them to better the control of their kilns and increase their production.

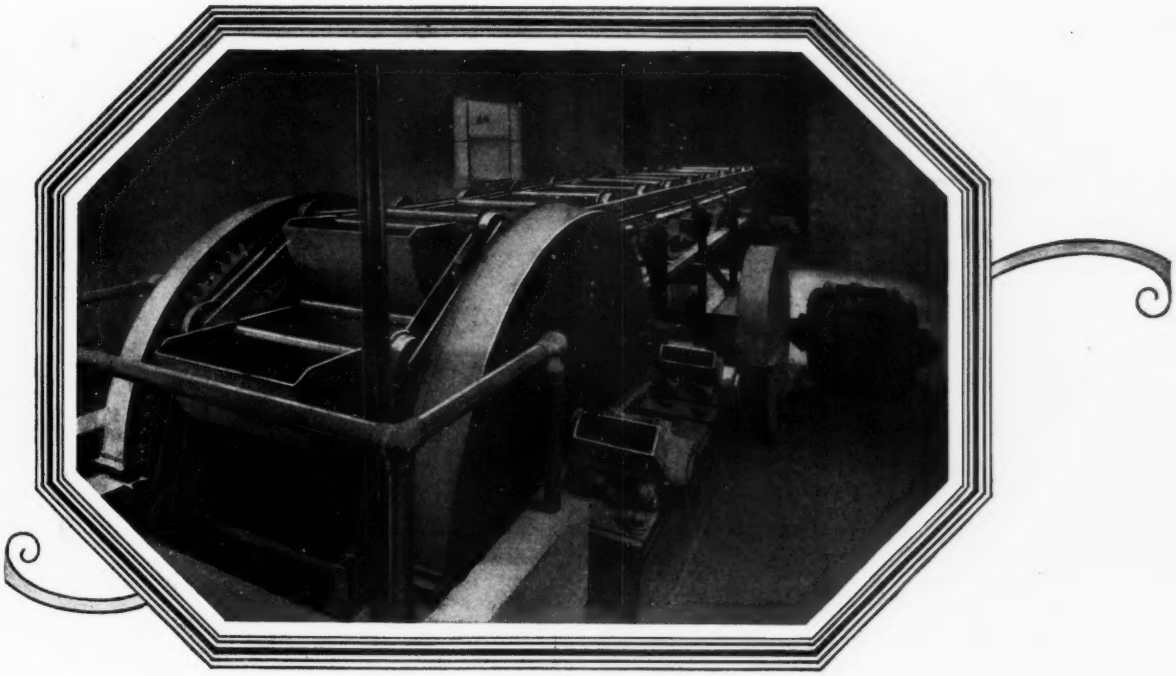
The other has replaced another type of pulverizer with the efficient Raymond Roller Mill, obtaining finer and more uniform coal which has enabled them to obtain the same production from 19 kilns, where formerly the operation of 20 was necessary.

Let us make you a proposition

Eastern Office:
50 Church Street,
New York City

Raymond Bros. Impact Pulverizer Co.
1301 North Branch Street Chicago, Ill.

Western Office:
1002 Washington Bldg.
Los Angeles, Calif.



THE severe service of handling hot clinker, cement, stone, and similar abrasive materials, as well as coal and ashes in the power plant, demands a most rugged, durable and effective type of equipment.

THE PERKINS PIVOTED BUCKET CARRIER meets the requirements of this exacting service with a minimum of operating and maintenance charges. It is sturdily built and mechanically correct in design, thus insuring years of reliable and dependable service. This is demonstrated by the number of Webster installations successfully operating in cement mills today.

Webster Engineers have had years of experience in designing and building elevating and conveying machinery for cement mills. Let them suggest a method for cutting the handling costs in your mill.

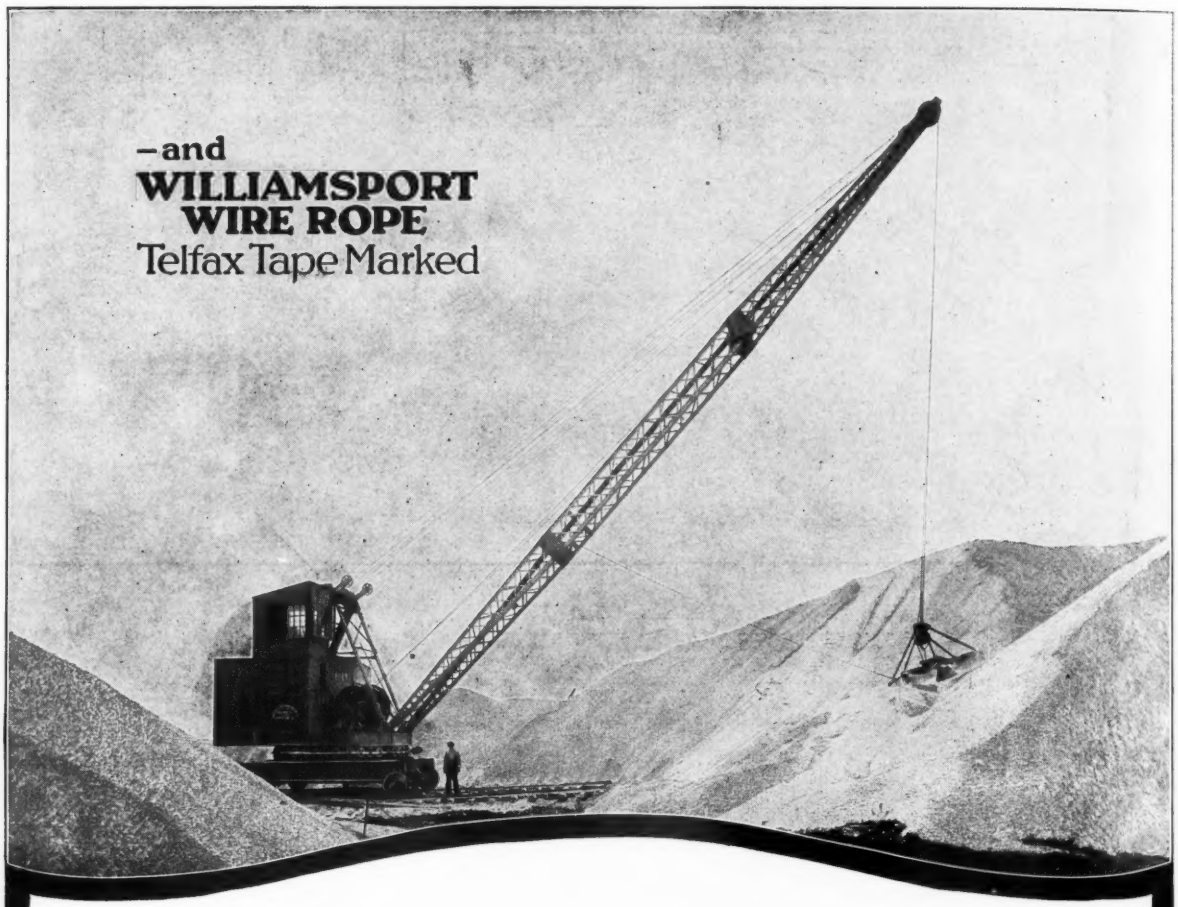
A FEW SUCCESSFUL INSTALLATIONS

Pennsylvania Cement Co., Bath, Pa.
Nazareth Portland Cement Co., Nazareth, Pa.
Southwestern Portland Cement Co., El Paso, Texas.
Crescent Portland Cement Co., Wampum, Pa.
Ogden Portland Cement Co., Ogden, Utah.
Hercules Portland Cement Co., Bellevue, Mich.
Oklahoma Portland Cement Co., Ada, Okla.
Louisville Cement Co., Louisville, Ky.

THE WEBSTER MFG. COMPANY

4500-4560 CORTLAND ST., CHICAGO

Factories-Tiffin, O. *and* Chicago - Sales Offices *in* Principal Cities



When Orton & Steinbrenner equip their mammoth cranes with

WILLIAMSPORT WIRE ROPE

—Telfax Tape Marked, they render a **distinctive** service to the user, they have spared no expense to deliver a super-quality product throughout—for there are many inferior wire ropes on the market which can be bought for much less money. And inferior **look** the same as **good** rope.

Any crane manfacturer can sell a crane, equipped with **inferior** rope or reputable rope of **uncertain** grade, and sell the unit for less than if "Williamsport" equipped.

If you want to know for a certainty the make and grade of wire rope you get, let your specifications add —"and Williamsport Wire Rope, Telfax Tape Marked."

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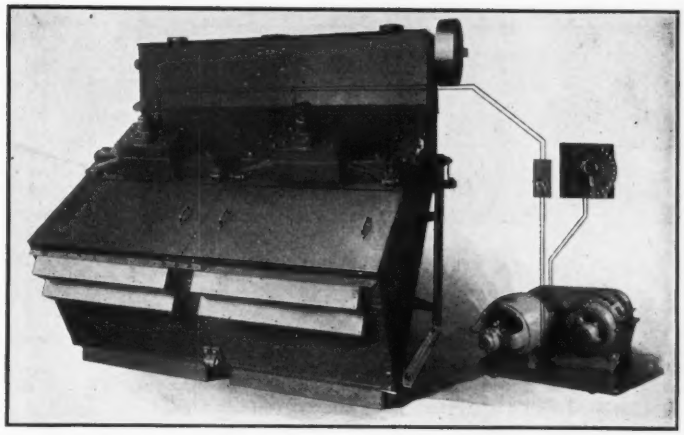


One HUM-MER saves $13,000 per year

THIS is the saving reported by C. E. Jewett, president of The Hocking Valley Fire Clay Company, manufacturers of Athena Vitrified Brick.

In the manufacture of Athena Brick, the HUM-MER has reduced the dry scrap from 15 brick to 5 brick per car, effecting a saving of 1,000 brick per day or $35, making $8,750 saved in scrap for the 250-day year.

In addition, Mr. Jewett is saving $5,000 a year in decreased rejections and is obtaining a quality of brick far superior to the old brick made with piano wire screens.

The photographs of Athena Brick show the advantages of using the HUM-MER process in making brick. Brick "A" was made with clay screened through a piano wire screen. Brick "B" was made with the same clay screened through the HUM-MER. Note the large cracks in Brick "A," and compare with Brick "B," made with HUM-MER screened clay.

Clay or shale screened through the HUM-MER is uniform in size—no large particles get into the brick to lessen its binding qualities and impair its strength and appearance.

Brick "A"
(Piano Wire Screen)
Note cracks and coarse texture, due to large lumps

Brick "B"
(Hum-mer *Electric* Screen)
Note texture and freedom from cracks, due to uniformly screened clay

Send for detail copy of
Hocking Valley Fire Clay Company's
HUM-MER REPORT

THE W. S. TYLER COMPANY, *Cleveland, Ohio*

Manufacturers of **Woven Wire Screens and Screening Equipment**

PLYMOUTH
Gasoline Locomotives

Predominate in Quarry Service

PREDOMINATE is a fine word. It means ascendent, chief, commanding, controlling, prevailing, regnant, sovereign, supreme, superior.

Superior in power, in numbers, in service. Therefore superior in design, construction, and handicraft.

These virtues have carried the PLYMOUTH Locomotive into a score of distinct industries, and made it the prevailing haulage unit in industrial equipments.

Read the letter in the panel on the right. It is the voice of the man who bought, used, and is glad.

The Fate-Root-Heath Company
Plymouth, Ohio

THE CONNECTICUT QUARRIES CO.
125 Temple St.
NEW HAVEN, CONN.

The Fate-Root-Heath Co.,
Plymouth, Ohio.

Gentlemen:

We purchased in February, 1918, two PLYMOUTH Locomotives and one in January, 1919.

These have been in operation since that time more or less continuously.

From our experience we cannot recommend too strongly the PLYMOUTH.

All your selling arguments have been verified and repair costs have been lower than we had expected.

It is with pleasure, from the results we have had, that we offer our hearty recommendation to prospective purchasers of your Gasoline Locomotives.

Yours very truly,
The Connecticut Quarries Co.
B. D. Pierce, Jr., Pres.

PLYMOUTH in Equipment of Connecticut Quarries Company, New Haven, Connecticut

Rock Products

Volume XXV | Chicago, May 20, 1922 | Number 10

Greenville Gravel Company Adds Two New Plants

By FRANK M. WELCH, Chief Engineer
The Greenville Gravel Co., Greenville, Ohio

These two new units, of distinct types, complete eleven sand and gravel plants for this company's operations. The Richmond plant has a daily output of 1200 tons and the Massillon plant 4000 tons

TWO new units, now completed and ready for operation as soon as the 1922 season opens for business, have been added to the nine sand and gravel washing plants operated by the Greenville Gravel Company, Greenville, Ohio. These plants are located in four states.

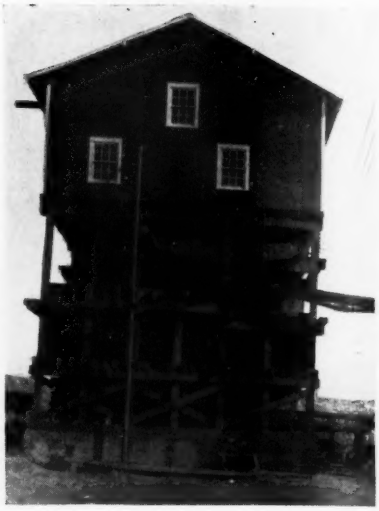
A new plant with 4000 tons' daily capacity—the Greenville Gravel Co.'s plant at Massillon, Ohio. Crusher house details and details of the conveyor gallery and the receiving hopper—at extreme right—are shown in drawings on following pages of this article

The new plants represent two distinct types. One is a plant of medium daily capacity with average storage facilities, and it acts as an auxiliary to one of the company's typical large operations in the same field for the purpose of serving an available market along a traction line which the larger plant cannot reach. The other is one more of the large type of plant of the Greenville concern which embodies many of their long-tried and standard methods of design and operation, yet —as each of their successive plants have done—contains improvements in construction and flow of material which will increase its efficiency over previous installations operating under similar conditions.

The Richmond Plant

The smaller of the new plants, located three miles east of Richmond, Ind., and a quarter of a mile from Richmond Plant No. 1, ships the bulk of its product over the lines of the Dayton and Western Traction Co., which operates trains of Western side-dump cars for that purpose. The traction company has constructed a double-track spur over which it handles the gravel trains between the plant and its line. The loading tracks pass underneath the bins at the plant and the entire layout is designed for rapid switching and loading.

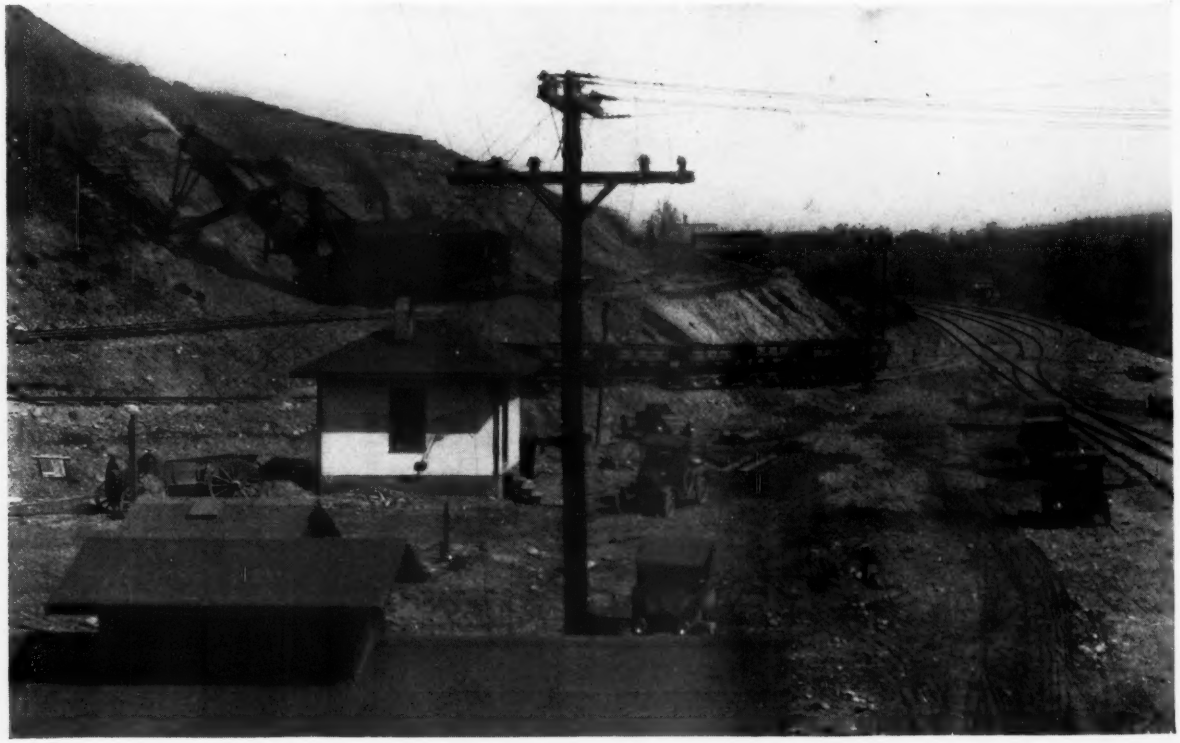
This plant, which has an output of 1200 tons per day, is served by a 1-yd. Erie

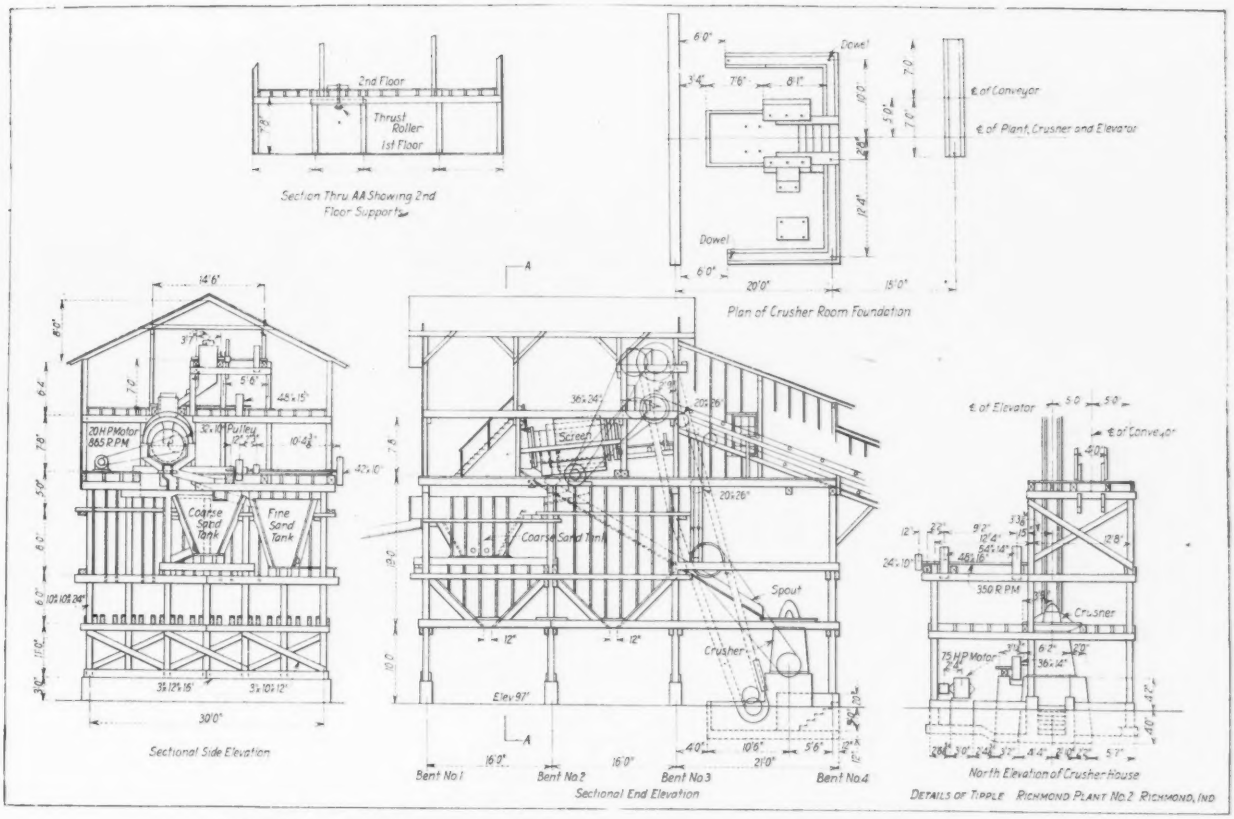


GREENVILLE CO.'S NEW UNITS

Three views of the Richmond plant, and one of the Massillon plant's source of supply. The two upper views show the exterior of the Richmond plant, a 1200-ton a day plant, and at the left is the 48-in. x 16-ft. triple-jacketed revolving washing screen of the same plant

Below is the large bank at the Massillon plant, with excavating shovel and the standard-gage tracks and side-dump cars





This gives a good idea of the tipple arrangement at the Richmond plant No. 2

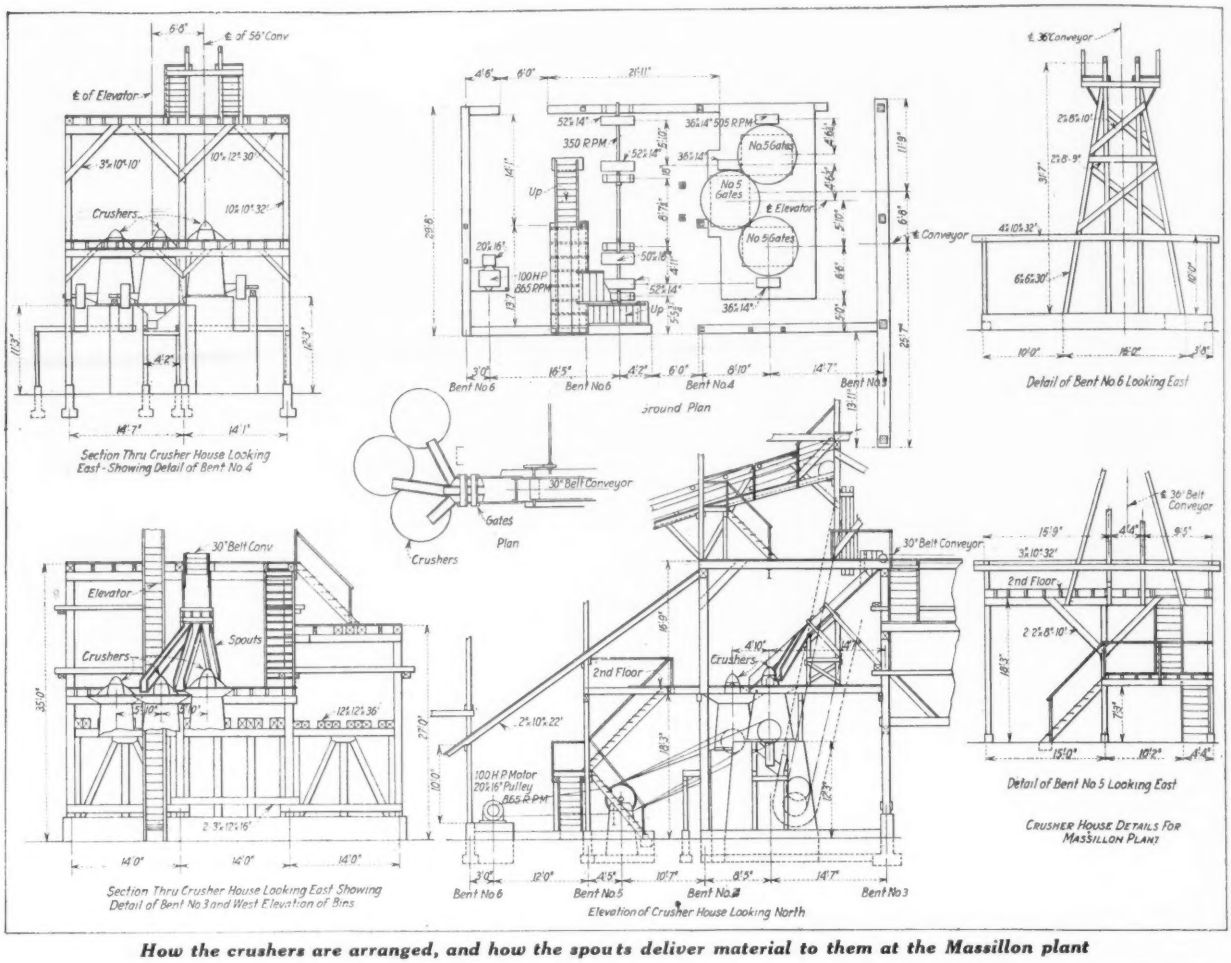
shovel with a standard-gage locomotive and 6-yd. Western side-dump cars for conveyance of material to the receiving hopper. A 24-in. belt conveyor, uniformly fed from the receiving hopper by a rotary feeder carries all of the material to the top of the plant. A 48-in.x16-ft. triple jacketed revolving screen washes and sizes the product. The oversize is rejected to a spout which conveys it to two No. 37 Kennedy gearless crushers, located on a concrete foundation beside the plant. A 20x9-in. continuous bucket elevator carries the crushed material back to the top of the plant, where it again enters the main washing screen. The elevator is made up of heavy steel overlapping buckets mounted on two strands of steel bushed bar link roller chain.

As to balance of equipment it consists of two settling tanks, one for coarse or concrete sand and one for fine or mason sand. Medium bin storage is available underneath the screen house, which is sufficient to insure prompt loading of the dump cars. The plant is also so situated and arranged that a good truck trade will be handled in the Richmond territory.

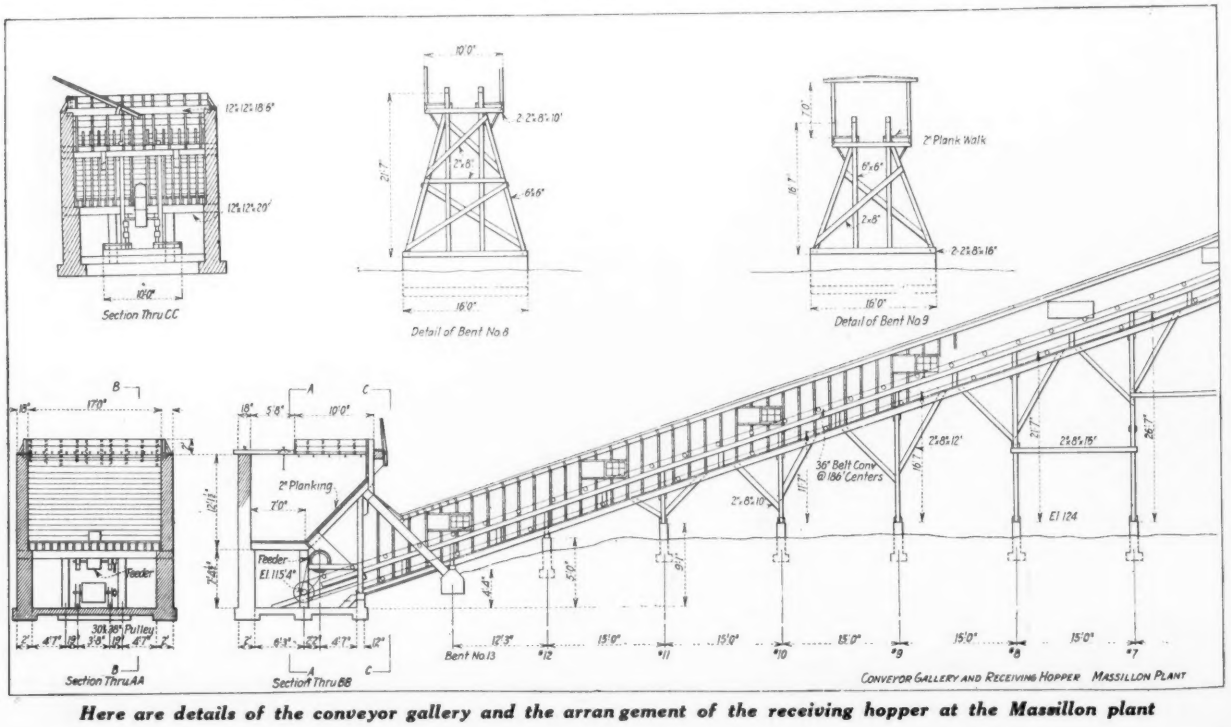
The Massillon Plant

The second new plant of the Greenville Gravel Co. is now ready to start. It has a capacity of 4000 tons per day and is located one mile north of Massillon, Ohio, on the Baltimore & Ohio railway. This

The two open doorways—one on the second and one on the top floor—show how a small hoist can be used for raising heavy pieces of equipment into the Massillon plant


Section Thru Crusher House Looking East - Showing Detail of Bent No 4
Ground Plan
Detail of Bent No 6 Looking East
Plan
Section Thru Crusher House Looking East Showing Detail of Bent No 3 and West Elevation of Bins
Elevation of Crusher House Looking North
Detail of Bent No 5 Looking East
CRUSHER HOUSE DETAILS FOR MASSILLON PLANT

How the crushers are arranged, and how the spouts deliver material to them at the Massillon plant


Section Thru CC
Detail of Bent No 8
Detail of Bent No 9
Section Thru AA
Section Thru BB
CONVEYOR GALLERY AND RECEIVING HOPPER MASSILLON PLANT

Here are details of the conveyor gallery and the arrangement of the receiving hopper at the Massillon plant

plant will be served by a No. 61 Marion shovel and, like the smaller unit at Richmond, with standard gauge locomotives and 6-yd. side-dump cars. A 36-in. belt conveyor will convey all of the raw material to the top of the plant, where it discharges into a 60x20-ft. triple-jacketed revolving screen. The feed end of the screen is equipped with a 60-in. diameter by 6-ft. scrubber, which will insure the thorough washing of the sand and gravel before it enters the perforated sections.

Fresh water is sprayed upon all of the material as it passes through the various screening surfaces and which rewashes and rinses any dirty water from the material which may adhere to it from the scrubber.

From the various jackets of the big screen, the different grades of gravel are spouted in any mixtures desired to the bins below. The sand which passes through the outer jacket is flumed to a large settling tank, together with the dirt-laden water. Here the clean sand is discharged direct to a sluiceway which conveys it to a low point in the property. The flume between the screen and the settling tank has facilities for separating the fine sand from the coarse when so desired and also for mixing sand in proper proportions with various grades of gravel when required.

This unusual arrangement of spouts discharges oversize material from the main screen to any one or all of three gyratory crushers. Details of this construction are shown on the opposite page

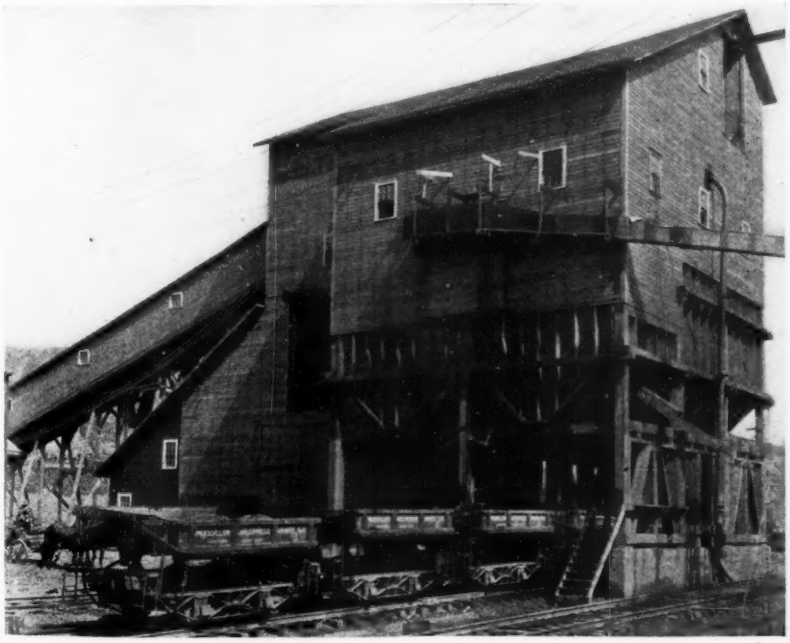
Disposal of Oversize

The oversize material which is rejected from the discharge end of the main screen is spouted directly to a 30-in. belt conveyor, which carries it back underneath the screen to a point below the main conveyor, where it is discharged into three No. 5 gyratory crushers. These crushers, part of which are especially designed and set for fine crushing, discharge the crushed boulders into a 27x14-in. continuous overlapping bucket elevator, made up of 3/16-in. steel buckets mounted on two strands of steel-bushed bar link roller chain. This elevator carries the crushed rock back to the top of the plant, where it re-enters the screen.

Electrically Driven Throughout

Both the Richmond and the Massillon plants are electrically driven throughout. The screens belt conveyor equipment, feeder and power transmission machinery were furnished by the Greenville Mfg. Co. of Greenville, Ohio, which is the maintenance department of the Greenville Gravel Co.

The Richmond elevator was furnished by the Webster Mfg. Co. of Chicago and Tiffin, Ohio, and the Massillon elevator by the Greenville Mfg. Co. All conveyor and transmission belting was furnished by the Allied Belting Co. of Greenville, Ohio. Both of these plants were designed and installed by the engineering department of the Greenville Gravel Co.



Loading tracks at the Massillon plant pass directly beneath the storage bins, as the illustration above shows. For a 4000-ton a day plant, it presents a very neat and compact appearance

Falling Costs Brought Big Building Increase in 1921

BUILDING operations in the United States increased 32 per cent in 1921 over the previous year, according to the Department of Labor. The wholesale cost of building materials decreased 38 per cent in the same period and the average total cost of one-family dwellings was $3925 in 1921 compared with $4314 in 1920.

Permits issued in 1921 were estimated to provide for 125 per cent more families than those issued in 1920. The statistics were based on reports from 140 cities.

Here is the plant whose capacity has been increased four times by careful planning and added equipment, making a plant without the usual disadvantages which are present in a remodeled plant. A steam shovel has replaced hand loading in the main quarry

A New Plant from an Old One

To make an effective and profitable plant with increased capacity when handicapped by the limiting features of the old plant, calls for real engineering talent. The job has been well done at the Federal Stone Co.'s plant, as the article below relates

WHEN you design and construct a new plant, whether it's for stone, sand and gravel, or other product, there are no limitations in selecting the most suitable layout and equipment for the particular conditions existing. But when an old plant is remodeled and enlarged it is not always easy to utilize the existing plant and merely add to it and obtain the most satisfactory result. Even expensive tearing down and reconstruction, and the discarding of some of the old equipment, do not often make possible the ideal arrangement.

At the Federal Stone Co., near La Grange, Ill., however, careful planning in the remodeling has resulted in a plant which could scarcely be better arranged to suit the conditions if it were entirely new.

Up to a year ago the plant was producing about 700 yd. daily. The equipment consisted of a No. 8 D and a No. 4 D Gates crusher and a No. 5 McCully crusher, a No. 8 elevator, two 48-in. x 16-ft. screens and two 40-in. x 16-ft. screens, a friction hoist, and 2½-yd. end dump cars. The quarry was worked by hand operation until a short time before the remodeling, when a steam shovel was placed in the quarry. To increase the capacity of the plant and at the same time reduce quarrying costs a No. 18 N Allis-Chalmers gyratory crusher was added in the new plant layout. This made possible less blasting, since larger blocks of stone could be handled in the crusher, and stone could be handled in larger cars. Stone handling on this first level was done formerly in 2½-yd. cars, and the new operating method provides for 6-yd. cars and a locomotive. A new hoist, a Seaverns transfer car, two new elevators, a scalping screen, two finishing screens, a belt conveyor and two Seaverns shaking screens complete the major part of the added equipment. A new screening house, two new bins, and a pit for the new crusher and hoist were added to the existing buildings. The present capacity of the plant is about 3000 yd. daily. An overhead carriage supported on I-beams over the No. 18 crusher carries a chain hoist which will take care of repairs on this large crusher.

The company's property consists of about 50 acres of practically level land, all underlaid with a good quality of limestone beyond the depth of 400 ft. which has already been tested. The overburden is very light, running from 1 to 3½ ft., and averaging 2 ft. over the entire surface. At present the quarry is being worked on two levels and the company plans soon to push down to a third level and maintain quarrying operations on all three levels.

Most of the stripping is done in the winter with the steam shovel, but when stripping is necessary during the operating season it is accomplished by drag scrapers.

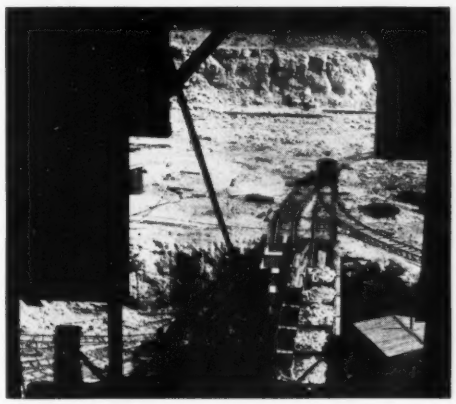
Making the original quarry cut to a depth of 37 ft. the quarry has been excavated uniformly to this depth over a roughly oval-shaped area of 12 acres. This cut is being continually extended, while at the same time a second cut 23 ft. deep has been sunk near the crushing plant and this has been worked out over an area of about an acre. As soon as this cut has been extended far enough to permit a third one without interfering with operations on the second, this third cut will be started.

In blasting, the usual shot consists of 18 to 20 holes at a time. From 3000 to 3500 lb. of Trojan 40 per cent dynamite

The screening plant—above the bins—and the left-hand bins and loading track are part of the construction added in remodeling the plant

TODAY'S OPERATING METHODS

The Federal Stone Co.'s quarry is being worked on two levels. At the left, above, is the steam shovel loading rock from the first level; hand labor is used on the second level, as the illustration at the right, above, shows. At the right is the incline from the first level, as seen from inside the crusher house, and below is a view of the plant showing the two main inclines at the right and the emergency or dull period incline at the left



is used for a blast, and this charge brings down 30,000 to 40,000 yd. of rock. A Bucyrus No. 70 steam shovel loads the rock into 6-yd. Western end-dump cars, which are hauled to the foot of the incline over standard-gage tracks by an 11-ton Porter locomotive.

On the lower level of the quarry the rock is loaded by hand into 2½-yd. end-dump cars.

A 48x30-in. Allis-Chalmers balanced electric hoist pulls the cars up the incline to the dumper. Two separate inclines are used, one for the cars from the first level and one for those from the second level. The illustration shows these two inclines at the right. The one with the loaded car midway of the incline is from the first quarry cut; the incline to the right of that one is from the second cut. At the left is a third incline; this was the original one, and will be used in the fall and during slack seasons to replace the other two, as will be explained later.

The hoist is arranged to serve both inclines, handling one loaded and one empty car at the same time on the two inclines. This method will not be used until the second level has been worked out enough to permit the use of the steam shovel on it. Until then the old hoist serves the incline from the second level. The hoist control is on an elevated platform so that the operator can watch both the hoisting operation and the crushing operation.

A Seaverns car dumper permits the 6-yd. cars to be dumped without any of the rock striking the rails. Rock from both inclines is dumped, not directly on the crusher spider, but in stone boxes on each side, which form a natural hopper to feed the stone into the No. 18 crusher.

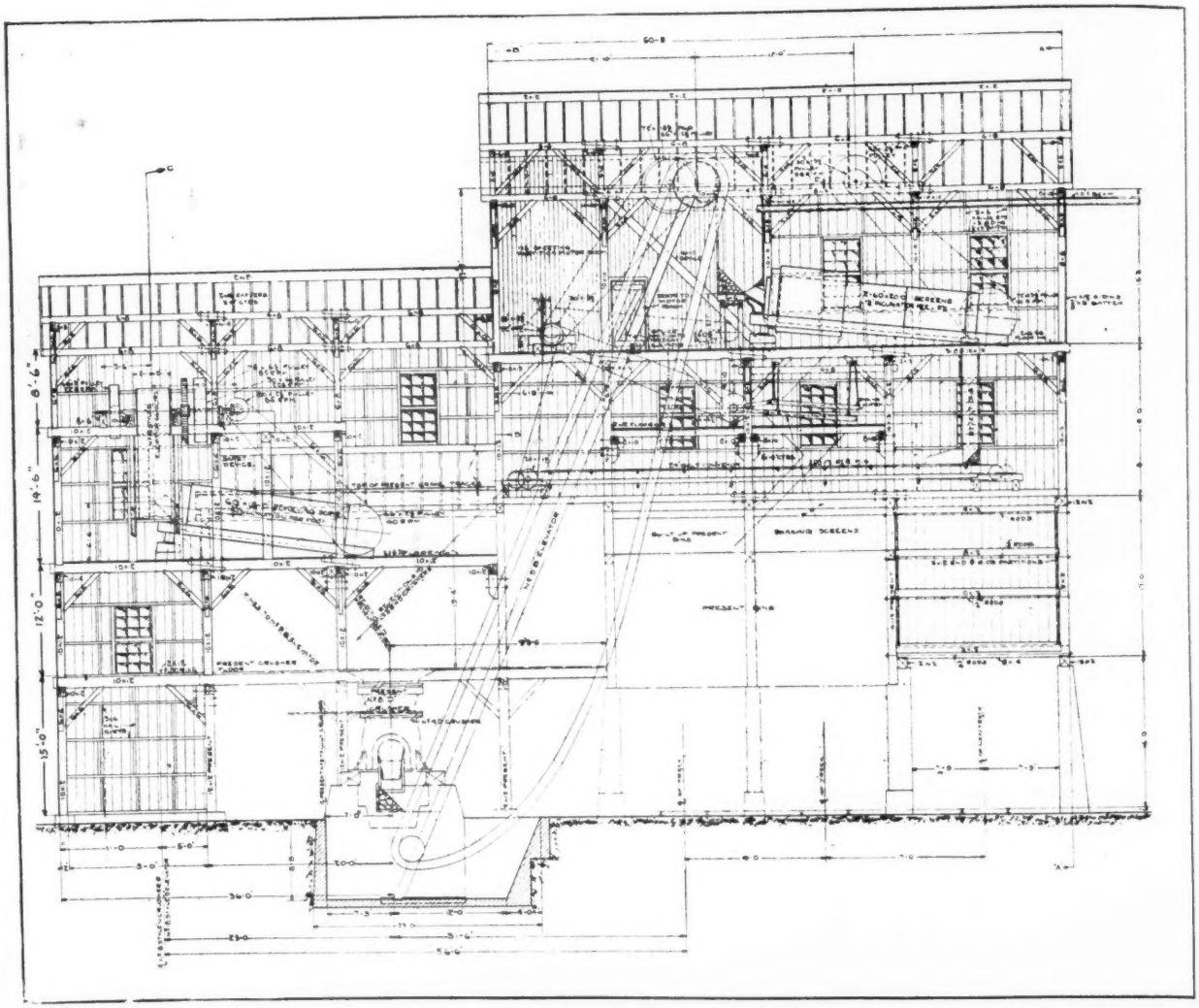
A Closed Circuit Plant

A 42-in. bucket elevator takes the stone from the No. 18 Crusher to a 60-in. x 16-ft. scalping screen. All the oversize from this screen goes to the No. 8 D Gates crusher which is located below it. The material from this crusher and half the material passing through the scalping screen goes on a No. 9 elevator to two parallel finishing screens each 60 in. x 24 ft. The other half of the material passing through the scalping screen goes direct to the No. 4 D and No. 5 McCully crushers, and from here by the same No. 9 elevator to the finishing screens. The oversize from the two finishing screens returns on a 24-in. troughing belt conveyor to the No. 4 and No. 5 crushers, through these, and again back to the finishing screens. This makes a closed circuit plant. The finishing screens produce three sizes of stone which are spouted direct to the bins—1½-in., 2-in., and 3-in. Material which passes the 1¼-in. jacket goes to two Seaverns shaker screens which produce 1-in., ⅞-in., and screenings. These sizes are spouted to bins ready for loading.

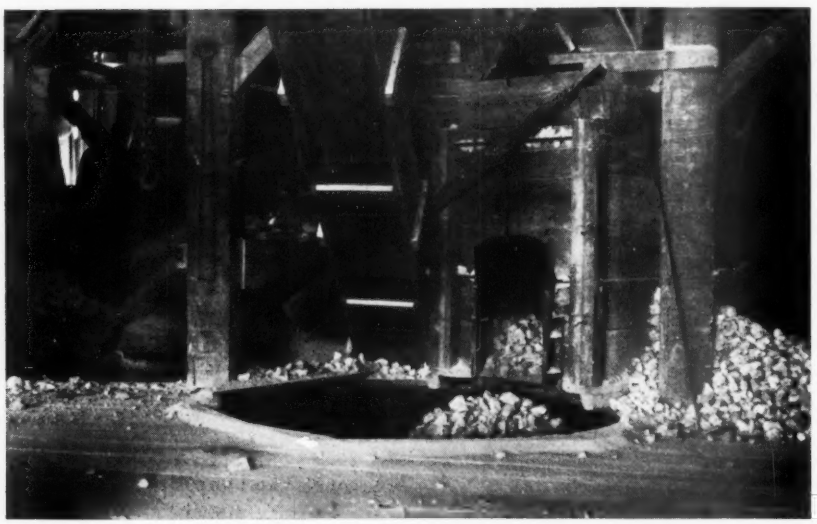
The six bins have a capacity of about 1200 yards. Material is shipped both by truck and by rail. A 35-ton Rock Island locomotive handles the railroad cars for loading, weighing, and, when necessary, for conveying to the storage piles. Outside storage of about 30,000 yd. is provided, and material is handled for storage by a 25-ton Ohio locomotive crane.

The average working force in the quarry and plant combined is from 22 to 25 men.

During dull seasons when the full capacity of the plant is not required the No. 18 crusher may be eliminated from the circuit. In this case the cars are hauled up the incline shown at the left



This sectional side elevation shows at the left the No. 18 elevator from the No. 18 crusher to the scalping screen, the position of the three secondary crushers, and the No. 9 elevator, the two finishing screens, the shaking screens, bins, and loading tracks

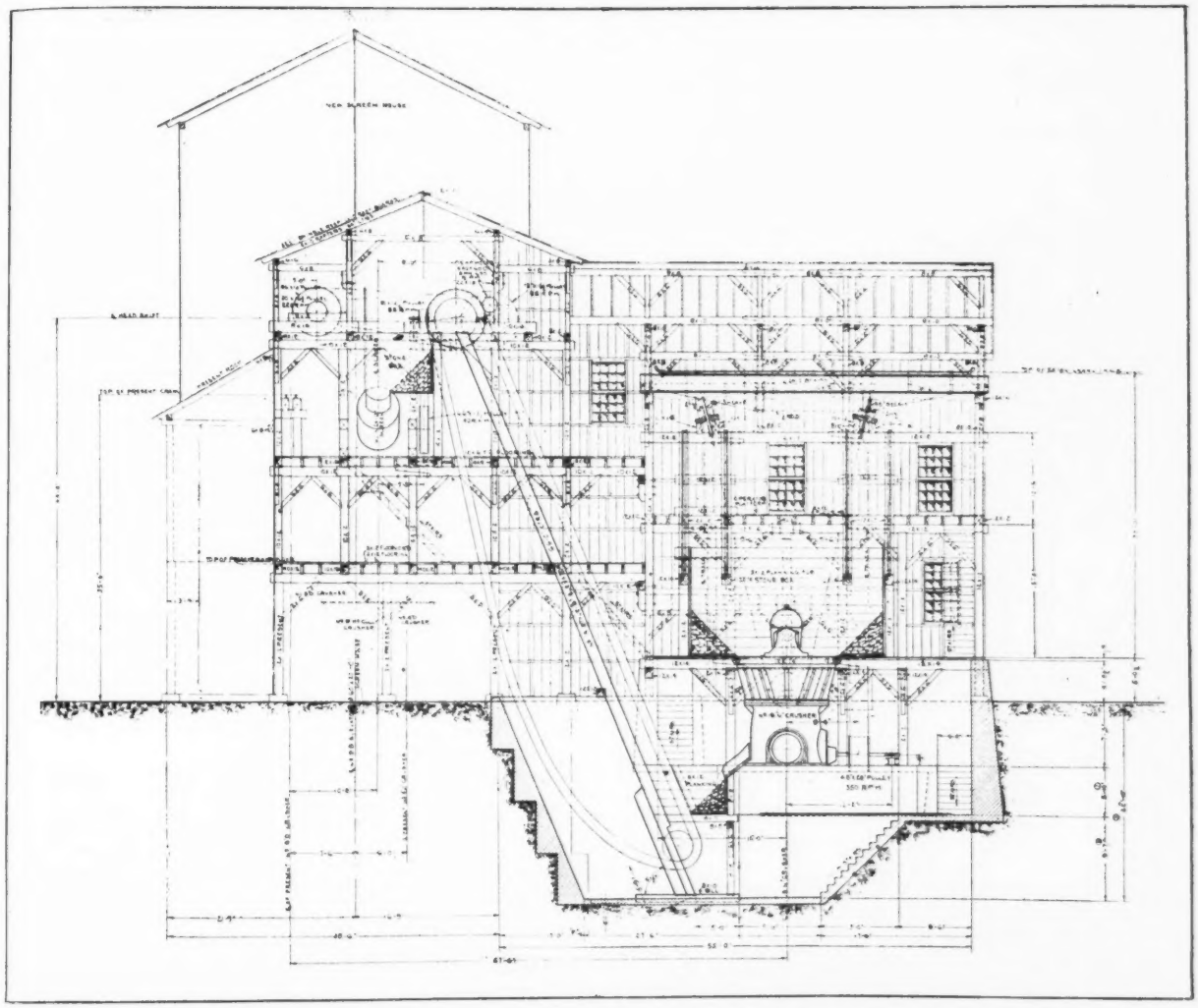


The secondary crushing operations include the No. 8 shown at the left, the No. 5 in the foreground, and a No. 4 back of and slightly to the right of the No. 5. These three crushers reduce material which does not pass the scalping screen

in the illustration simply by shifting the cable to the old hoist, which operates the left-hand incline. Material will then be dumped directly into the No. 8 crusher without passing through the No. 18 crusher, the No. 18 elevator, and the scalping screen. This alternative is always possible, too, in any emergency where some of the preliminary equipment is waiting for repairs.

The plant is electrically operated. A 150-hp. motor drives the No. 18 crusher; a 60-hp. motor is provided for the hoist; a 75-hp. motor for the No. 18 elevator and scalping screen; a 75-hp. motor for the No. 8 crusher; a 40-hp. motor for the No. 5 crusher; a 35-hp. motor for the No. 4 crusher, and a 100-hp. motor for the two finishing screens, the No. 9 elevator, the belt conveyor, and the two shaker screens.

A Chicago Pneumatic compressor furnishes the compressed air, and is driven by a 60-hp. motor.



In this sectional end elevation are shown the car dumpers, the No. 18 crusher, the No. 18 elevator, and the scalping screen, together with the location of the three secondary crushers

Four pumps keep the quarry free from water. A Worthington duplex pump operated by compressed air pumps surface water to the boilers, and three others, an American Well Works centrifugal 3½-in. discharge, an Allis-Chalmers 6-in. discharge, and a Worthington centrifugal 3-in. discharge, all electrically driven, are used for keeping the quarry drained. One or both of the smaller pumps is ordinarily sufficient; only in exceptionally heavy rain-falls is the larger pump required.

How a Fire Tank Saved the Plant

At the plant a Worthington duplex air driven pump takes water from the discharge pipe to the 5,000-gal. fire tank at the top of the plant. This tank, with a 2-in. fire line through the plant and six nozzles, provides adequate protection for the plant; it has, in fact, saved the plant from destruction once. A few months ago during the noon hour smoke was observed in the plant by a passer-by on the highway, and a quick application of water from the nearest nozzle saved the plant from anything worse than a few well-scorched planks on an interior wall. A grid on a starter had become overheated, some oily waste nearby was ignited, and but for the excellent protection which had been provided the plant would have burned completely.

This fire tank is of wooden construction and located at the top of the new screen house nearest to the quarry, where it gives protection to the entire plant. Four of the nozzles are inside the plant and two are outside. Operated in connection with the pumps, this storage of water will stop any fire which has not gained too much headway.

The remodeled plan as it has been described was designed by Allis-Chalmers Co.

Officers of the Federal Stone Co. are: Daniel Foley, president; H. R. Kasson, secretary-treasurer; Allen Foley, general superintendent; and M. S. New is quarry superintendent.

The plant superintendent, M. S. New

Hints and Helps for Superintendents

Handy Bin-Gate System

LOADING three sizes of stone separately, or a mixture of any two or all three sizes, with a motor truck in one position is accomplished by a clever bin arrangement at the quarry on the Ernest Flagg estate, Staten Island, N. Y. The bin is built in three compartments as illustrated in the accompanying sketch. The views show the quarry, crushing plant and loading bins of a plant designed to produce about 250 tons of crushed stone per day.

The stone is a greenish impure soapstone, much used by Mr. Flagg, who is a prominent New York architect, in building work on his estate. It also makes a first-class road stone and concrete aggregate. As this is the only quarry on Staten Island it does a good business at a $2.50 per cu. yd. f.o.b. quarry price, or better.

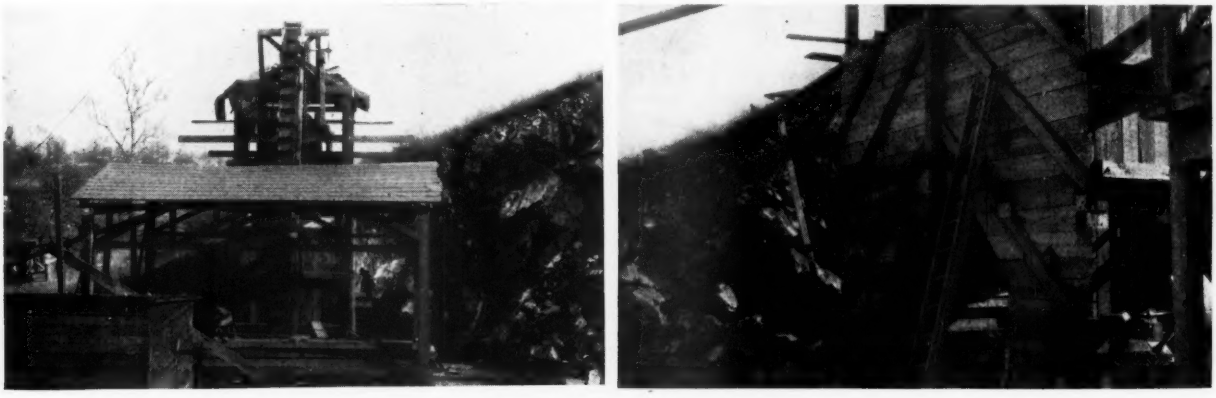
The plant has an initial jaw crusher and a bucket elevator. It was designed by George E. Conway, Tenafly, N. J., and Earle C. Bacon, Engineers, Inc., New York City. A. E. Beaver is superintendent of the Flagg estate and general manager of the crushing plant.

How to Remove Incrusting Solids from Water

PURE lime and soda ash are needed in the removal of incrusting solids from water. In this article is a chart showing the amount required. Frequently a water analysis is given in the hypothetical combinations and one desires to determine quickly the amounts of lime and soda ash necessary to soften the water, declares F. D. Yeaton in *Railway Maintenance Engineer*. The amount of chemicals necessary to change or remove each scaling salt may be calculated from the analysis, but it is a rather tedious job, and usually requires a review of chemistry.

To obtain the amount of quicklime or slaked lime required, the chart should be read upward, and to determine the amount of soda ash, downward. If lime is required to remove the incrusting solids, it is shown by a diagonal full line, and if soda ash, it is shown by a diagonal dotted line. For both lime and soda ash, the incrusting solid is given over a full line and also over a dotted line.

When the purity of the lime or soda ash is known, the results obtained from the chart should be divided by the percentage of purity in each case. If the purity of the lime or soda ash is unknown, one can make a close approximation by dividing the amount of quick or lump lime obtained from the chart by 0.90, and the amount of soda ash by 0.95. The softening of water with lime is dependent on the content of available cal-



Stone is quarried, crushed, and conveyed to the screens, at the left, into the 3-compartment bin at the right

A close-up of the bin, and the sectional drawing, show the gates and construction details

cium oxide in the lime, and the softening with soda ash depends on the available normal sodium carbonate in the soda ash. If the analysis is given in parts per million, it is only necessary to multiply by 0.0583 to obtain grains per U. S. gallon. To convert the grains to pounds per 1000 gal., multiply by 7.

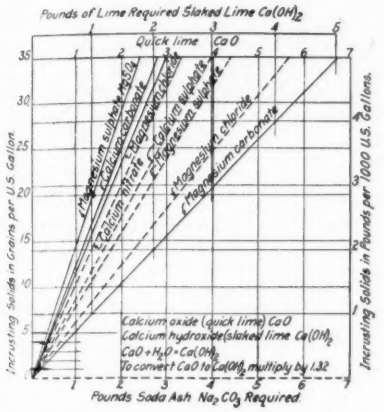

Pounds of Lime Required Slaked Lime $Ca(OH)_2$
Quick lime CaO
Incrusting Solids in Grains per U.S. Gallon
Incrusting Solids in Pounds per 1000 U.S. Gallons
Calcium oxide (quick lime) CaO
Calcium hydroxide (slaked lime) $Ca(OH)_2$
$CaO + H_2O = Ca(OH)_2$
To convert CaO to $Ca(OH)_2$ multiply by 1.32
Pounds Soda Ash Na_2CO_3 Required

Chart showing amount of lime and soda ash required

Lime a Protective Against Rusting of Iron

LIME is a good and cheap preventive against the rusting of iron. Simple tests have been made which demonstrated this valuable property of lime. Montgomery Meigs of Keokuk, Iowa, writes in *Power*, mentioning a very careful experiment which he conducted to ascertain the ability of lime to prevent the rusting of iron. For the purpose he submerged two pieces of sand-blasted and polished angle iron in two vessels of river water. To one of these jars was added spent lime, while the other was left untreated. After several months the two pieces of iron were inspected for presence of rust. The bar of iron taken from the untreated river water was completely covered with a thick coating of iron rust, part of the oxide having fallen off and settled in the bottom of the jar. Preliminary observations showed that this bar began rusting almost immediately after being placed in the water. The condition of the other bar was quite different. Its polished surface at the end of the test was as perfect as the day it went into the jar. The writer also states:

This protective action of lime water is made use of by English hostlers, who are accustomed to take the highly polished steel bits from the horses' bridles when they come in from a trip and throw them into a bucket of lime water to prevent them rusting before they get time to give them their daily polishing. I find that lime water is effective in preventing rust in the bottoms of steel hulls, which nearly always have more or less bilge water in them, often from condensation of atmospheric moisture when there is no leakage. Whitewash is also an excellent preservative of steel in inclosed places.

April Is Portland Cement's Record Month—14,498,000 Barrels

THE statistics shown in the accompanying table, prepared under the direction of G. F. Loughlin of the U. S. Geological Survey, are based mainly on the reports of producers of portland cement, but in part on estimates. Estimates for April were made necessary by the lack of returns from four producers.

The Bureau of Foreign and Domestic Commerce of the Department of Commerce reports that imports of hydraulic cement in March amounted to 1597 bbl., valued at $4308. The total for 1921 was 122,317 bbl., at $388,828. The imports in March were: From Mexico, 902 bbl.; France, 322 bbl.; Japan, 253 bbl.; other countries, 120 bbl.

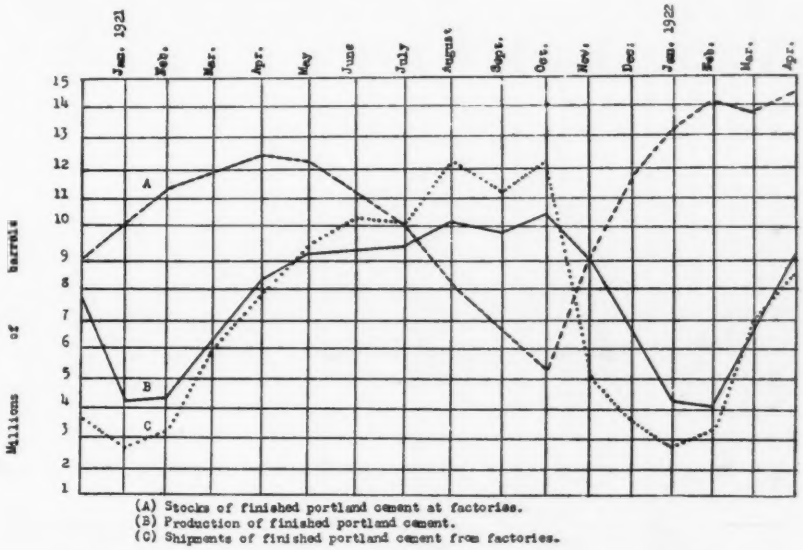
The exports of hydraulic cement in March were 103,556 bbl., valued at $299,977; of this total 103,219 bbl., at $298,764, was portland cement, which was sent to Cuba, 43521 bbl.; the other West Indies, 3763 bbl.; South America, 30,881 bbl.; Central America, 11,585 bbl.; Mexico, 10,660 bbl.; Canada, 256 bbl.; other countries, 2553 bbl. The total exports of hydraulic cement in 1921 were 1,181,014 bbl., valued at $4,276,986.

The statistics of imports and exports of hydraulic cement in April are not available.

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT IN APRIL, 1922, AND PRECEDING MONTHS

Month	Production (barrels)		Shipments (barrels)		Stocks at the end of month (barrels)	
January	4,098,000	*4,291,000	2,539,000	*2,931,000	10,300,000	*13,316,000
February	4,379,000	4,278,000	3,331,000	3,285,000	11,400,000	*14,142,000
March	6,763,000	6,685,000	6,221,000	7,002,000	12,000,000	*13,848,000
First quarter	15,240,000	15,254,000	12,091,000	13,218,000		
April	8,651,000	9,243,000	7,919,000	8,592,000	12,600,000	14,498,000
May	9,281,000		9,488,000		12,450,000	
June	9,296,000		10,577,000		11,150,000	
Second quarter	27,228,000		27,984,000			
July	9,568,000		10,301,000		10,414,000	
August	10,244,000		12,340,000		8,280,000	
September	10,027,000		11,329,000		6,953,000	
Third quarter	29,839,000		33,970,000			
October	10,506,000		12,114,000		5,348,000	
November	8,921,000		5,195,000		9,091,000	
December	6,559,000		3,697,000		11,938,000	
Fourth quarter	25,986,000		21,006,000			
	98,293,000		95,051,000			

*Revised.



(A) Stocks of finished portland cement at factories.
(B) Production of finished portland cement.
(C) Shipments of finished portland cement from factories.

Fluctuations in production, shipments and finished stock of portland cement

Doubling a Plant's Capacity

In this description of the modern lime plant of the Ohio Hydrate and Supply Co. is given the additions to plant and equipment which will enable the company to produce more than twice as much as before

GEOLOGY tells us that limestone rock is the calcereous deposits of various forms of marine life resembling our present-day clam and oyster. These masses of shells and animal remains were stratified and compacted upon the bottom of the sea by the never-ending and untiring action of the water.

Finally, through an upheavel of the earth's crust, these deposits appeared above the sea level as limestone ridges and outcroppings.

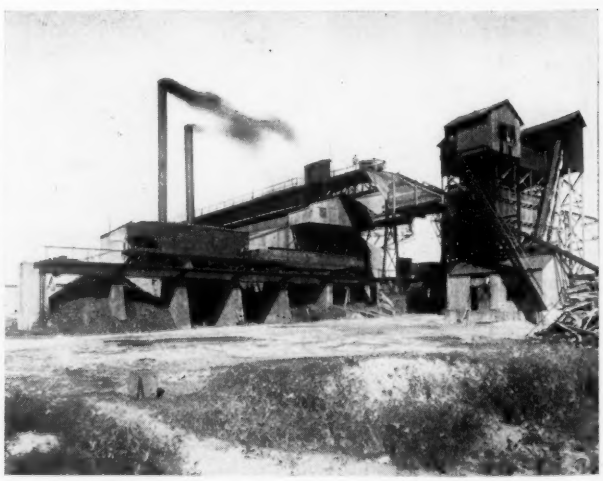
From a purely chemical standpoint, there are two kinds or species of limestone. One is made up largely of carbonate of calcium while the other consists of carbonate of calcium and magnesium.

This last kind, with its high content of magnesium, is known as dolomitic limestone. It is from this dolomitic formation that the best grades of finishing lime are made, this being due to the liberal proportion of magnesium, which makes an unusually white lime upon calcination.

Geological surveys have shown that the section in and around Woodville, Ohio, is particularly rich in deposits of dolomites. Many thousands of fossils are found imbedded in the rock.

In establishing the plant of the Ohio

The quarry, originally opened to a depth of 30 ft., has since been deepened to 55 ft.



Limestone is hauled in steel cars up the incline shown at the left. At the right hand is shown a man at the top of the incline controlling the cars; the same man from this position guides the cars to the proper kiln where they are dumped

The old battery of kilns, at the right, consists of 12 units each 31 ft. high. At the left are the 12 new kilns, each 36 ft. high, giving the plant a daily capacity of 450 tons of finishing hydrate

Hydrate and Supply Co., at Woodville, considerable stripping was necessary. The quarry originally opened with a face of about 30 ft., but this depth has been increased to about 55 ft. The next step was the drilling and breaking up of the rock by explosives. The masses are then broken into fragments of 6-in. cubical dimensions, suitable for burning. They are then loaded into dump cars and taken to the kilns for burning.

Four firing floors extend along either side of two rows of kilns. Each kiln has two firing doors on each side, or a total of four firing doors to each of the 24 kilns. A new kiln building the same size as the old one has been added, and the new kilns are 36 ft. high. The old kilns were 31 ft. high. The new coolers are about three times the size of the old ones.

The new battery of 12 double kilns, added within the last year brings the daily capacity of the plant to 450 tons of finishing hydrate.

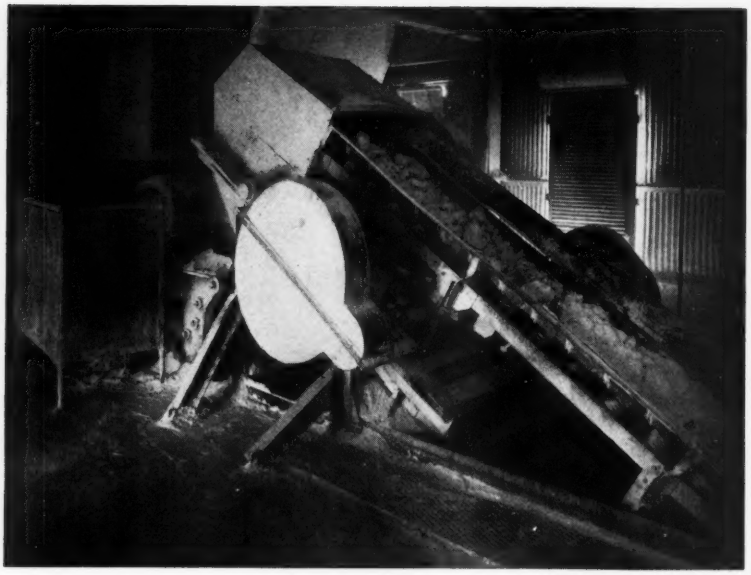
The firing of lime kilns is carried on very systematically. These kilns are under fire day and night for a period of eight to twelve months during the year, depending on the life of fire-brick lining and business conditions. The furnaces are charged every 30 min. and the fires are thoroughly cleaned every four hours after each draw. The coal does not come in contact with the stone, but is burned in furnaces on opposite sides of the shaft through which the stone passes, and the flame and gas from the fuel, tempered with steam introduced below the burning coal, is drawn up through port holes into the heated stone where it liberates the carbon dioxide. This explains why the lime comes out pure white, free from all taint of coal smoke.

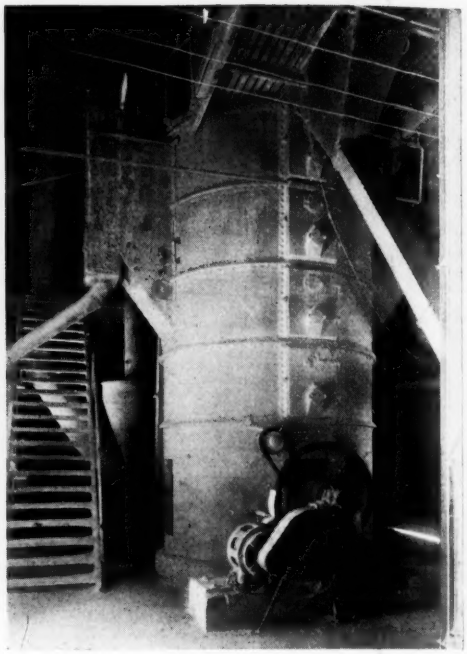
It is essential that heat of certain quality be maintained quite uniformly throughout the burning process in order that the carbon dioxide be removed without injury to the calcium or magnesia. This is very essential in the manufacture of high grade finish lime.

The lime floor—sometimes called the cooling floor—is located under each of the two batteries of kilns. The kilns are kept filled with stone and a charge of lime is removed, or drawn from each kiln, every four hours, day and night, during the eight to twelve-month period the kilns are under fire.

The lime is still hot when drawn from the kilns, but after it is allowed to cool,

Under the kilns is this cooling floor, from which the burned limestone goes on an endless conveyor from the piles shown to grinders at the far end of the room where it is pulverized





From the cooling floor burned limestone is conveyed to the grinder above, then to the hydrator at the right, back of which is a mill where over- or under-burned particles are removed

it is carefully picked over to separate any over-burned or under-burned pieces which may come through. This done, it is carried to the crushing machine at the farther end of the cooling floor, by means of an endless pan conveyor.

The crusher reduces the burned lime to a pulverized state, from whence the ground mass is conveyed into the bin immediately behind the crusher. From this bin it goes by screw conveyor to the elevator and thence to a feeding hopper above the poidometer, and operates automatically in conjunction with it. The poidometer measures water and weighs the lime with accuracy and precision.

The passage of the lime into the hydrator is accurately gaged and automatically controlled. The lime passes over an endless belt operated by an eccentric which also automatically pumps the required amount of water into the hydrator exactly in proportion to the weight of lime delivered by the poidometer.

The hydrating equipment consists of a Schaffer hydrator which has been in service five years, and a Clyde hydrator which is being installed now. A second Schaffer hydrator with an hourly capacity of 13 tons will make the total hydrating capacity 30 tons an hour. Foundations are now being dug for the new hydrate building, which will be of structural steel and concrete, with sides and roof of corrugated galvanized iron, like the other buildings.

As the lime passes into the hydrator it is constantly agitated by huge plows while being subjected to moist steam from which the moisture is absorbed by this mechanical slaking process. Entering the hydrator at the top, the lime passes over eight levels in the process of hydration, coming out at the bottom completely slaked and having been subjected to conditions that render all the elements active.

As the lime comes from the hydrator it is dry and comparatively cool and is delivered direct to Raymond mills where it goes through an air separation process which removes all the particles of over-burned or under-burned lime which may have been carried through the crusher. The enlarged plant will have four Raymond mills, each with a capacity of seven tons an hour.

After passing through the Raymond mills, the lime is forced by a current of air to storage bins above the packing room. From these bins the lime is placed in valve bags by means of specially designed automatic machines. The third four-tube bagging machine was recently installed, and a fourth will be put in as soon as the new hydrate building can be put in operation.

From the bagging machines, the lime is either loaded directly into cars, or conveyed into the warehouse for storing. A new warehouse has been constructed along the loading track with a capacity of nearly 1000 tons of bagged lime. A track has been added under the stone crusher, and another spur added to the lime-loading branch will give a loading capacity of 24 cars a day.

The company has its first boiler of 125 hp. installed six years ago, and a second boiler of 150 hp. installed two years ago. About a year ago an Ingersoll-Rand duplex air compressor of 370 cu. ft. of air per min. capacity was installed, and a new Loomis electric well drill, driven by an 11-hp. motor, has just been added.

All these additions and improvements will increase the capacity of the plant about 120 per cent. Besides the additions already given, seven houses for workmen and a blacksmith shop have been added.

The company maintains a complete crew of men whose time is devoted to repairing cars and fitting them to properly carry shipments of lime.

The engineering and designing as well as the special kilns and the general directing for setting the plant in operation were handled by the Schaffer Engineering and Equipment Co., Pittsburgh, Pa.; erection of building by Massillon Bridge and Structural Co., Massillon, Ohio, machinery and equipment were furnished by Webster Manufacturing Co., Chicago; air separating and grinding equipment by Raymond Bros., Impact Pulverizer Co., Chicago; bagging machinery and bags by the Valve Bag Company of America, Toledo, Ohio; motors by Lincoln Electric Co., Cleveland, Ohio; Ideal Electric Co., Mansfield, Ohio; and Allis Chalmers Co., Milwaukee, Wis.; air compressors by Ingersoll-Rand Co., New York City; hoisting machinery by Lidgerwood Co., New York City; castings and machine work by Multiplex Concrete Machinery Co., Elmore, Ohio; stone handling machinery by Barber Greene Co., Aurora, Ill.; electric drilling machinery by The Loomis Machine Co., Tiffin, Ohio; screening machinery by Stevenson, Adamson Co., Aurora, Ill.; refractories by Harbison-Walker Refractories Co., Pittsburgh, Pa.; and Pyro Clay Products Co., Oak Hill, Ohio; and boilers by Gem City Co., Dayton, Ohio, and Erie Steam Boiler Co., Erie, Pa.

The Removal of Clay from Sand and Rock

By EDMUND SHAW, El Paso, Texas

This eighth installment describes the process of disintegrating and scrubbing by the jet, or hydraulic, elevator. Other devices are also described wherein Mr. Shaw's studies and broad experience have enabled him to give a thorough and practical presentation of them

UNDOUBTEDLY the most widely used and useful of all hydraulic devices for disintegrating and scrubbing material that has to be washed is the movable nozzle supplied with water under high pressure, known as a "giant," "gun," or other local name. "Washing begins at the bank," as has been said so often, and this is doubly true where hydraulic methods are used.

Hydraulicking, as this combined method of washing and mining is known, is not so very old, for it is only in comparatively recent times that men have been able to make the pipes of sufficient strength to stand the high pressures required, at a cost which would permit their use. It was developed by the placer miners of California—they probably got the idea from a much older method known as "ground sluicing," the simplest of mining and washing methods. It consists in merely leading a running stream across the deposit, which must be somewhat flat and slope in the right direction, allowing the water to wash out the fine material and carry it to the sluice boxes, in which the gold is recovered.

The streams in the mountains of California near the placer deposits furnished abundant water and at a head which often gave more pressure than was practical. One operation is mentioned which employed water under 1720 ft. of head. The tremendous force of such streams literally tore down mountains, and the dirt so choked the streams and rivers that a state law had to be passed forbidding these operations except in those situations which permitted the debris to be impounded.

Efficiency of the Hydraulic Elevator

It was often a problem with these early miners to secure sufficient fall to carry away the water and dirt from these operations, but this problem was usually solved by the introduction of the hydraulic, or jet, elevator. This was an old device by which a small amount of water at a high pressure could be made to pump a large amount of water against a low head. It was frequently used for such humble work as emptying wet cellars and draining the sumps of mines. The placer miners redesigned this machine in accordance with the laws of hydraulics, by which it operated, and made it a much more efficient machine.

In addition to its advantages as an elevator, it was found to be an excellent device for disintegrating and scrubbing, and it was, and still is, often used for that purpose alone.

The Giant as a Washing Device

Deferring for a moment the description of the hydraulic elevator, we will first consider the use of the giant, or gun, as a washing device. It has a wider use in that way than one might think at first, and its place is that of a preliminary washer between the plant and the bank. As an example, consider its use in a Florida phosphate mine, the only one of which the writer knows in that field, mining the crude material by dragline excavators, all the others using hydraulic methods. In this plant the crude material is brought in from the field in standard-gage railroad cars of special design. They are like ordinary wooden freight cars except that the side toward the plant as the car is run in on the side track is open and covered with a bar screen. A giant supplied with a stream of water under a fairly high pressure sluices the material out of the cars through the bar screen. It falls into a broad launder and is carried to the 1¼-in. screen which removes the clay balls, and then on to the rest of the plant.

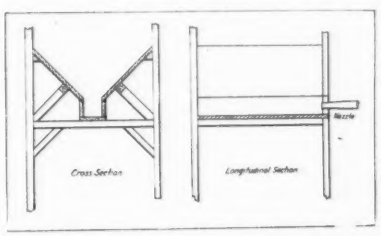


Fig. 1—Cross-section of the sluicing bin

In several of the Tennessee phosphate plants the crude material is given a preliminary wash in the same way. The "muck" is brought in from the fields in small dump cars which discharge into a bin. In one plant a regular revolving tipple used in the coal fields is employed to discharge these cars. The outlet from the bin is covered by bars, which are sometimes movable, to form a "finger gate." The material is sluiced out through these bars, giving it a preliminary wash and feeding it evenly to the plant. In another plant the material, after being "gunned" from the bin, goes out to a flat table with a low slope. The slope is sufficient to carry off the pieces of ordinary size, but lumps of limestone and large pieces of clay move so slowly on the slope that they can be picked off by the "gun man" and thrown to one side.

Washing Plant Efficiency Depends Upon the Operator

In all these instances the giant must have an operator, and the efficiency of the washing plant depends upon his skill. If he is careless he can flood the plant with dirty material beyond the power of the plant to handle, and if he does not understand how to use the gun he may delay operations considerably. It is possible, however, to make this operation automatic, and Fig. 1 shows how this was done at a sand and gravel plant in Virginia.

The material at this plant was brought in from the bank by a dragline cableway and dumped into a bin which stood high enough to feed the plant from the outlet at the bottom. The bottom of the bin sloped at 45 deg. both ways to a flat sluice or trough. A gun was set horizontally to throw its stream into the end of the sluice. By setting the stream just right the sloping sides, combined with the effect of the water, gave an even feed to the plant and broke up the lumps very satisfactorily. The writer recently introduced a bin of somewhat similar design in a small sand and gravel plant, and it is reported as working well.

Washing by Double Hydraulicking

Washing by double hydraulicking has

been practiced. There is an excellent example of this work at a phosphate mine in Tennessee. The ground worked at this mine is very heavy with clay, as it largely

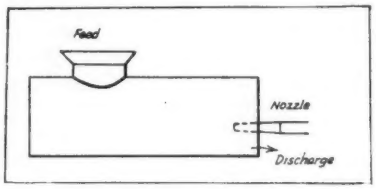


Fig. 2—A sketch of a jet washer which proved to be an efficient disintegrator

consists of "throwbacks," or the reject from early operations conducted to save only the lump rock in the deposits.

The material is sluiced from the bank by 1½-in. nozzles under 125 lb. pressure. This material is elevated by a jet elevator to give it the necessary fall, and then it runs to two brick tanks, or cisterns, which stand above the main washing plant. These tanks are about 50x100 ft., as the writer remembers them, and on one side there is an overflow over which the excess water runs and carries away the greater part of the clay. The tanks are so filled that one is filling while the other is emptying. When a tank is filled a nozzle of the same kind used in mining is turned on the material in the tank and sluices it down a launder which leads to the main washing plant. In this operation the material receives three washings before reaching the plant proper: The washing at the bank, the scrubbing received as the material passes through the jet elevator, and the hydraulicking from the brick tanks. As well as being the most thorough preliminary washing that the writer has noted, it also reduces the work to be done at the plant to the minimum and gives large capacity to the various plant units.

In an old description of a "land-pebble" phosphate washing plant the writer found a sketch of the jet washer shown in Fig. 2. It is a cylinder made of boiler iron, 2 ft.

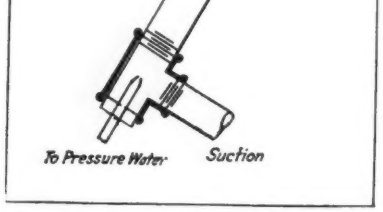


Fig. 3—This simple form of jet elevator is made of pipe and fittings

in diameter and 6 ft. long, which has a feed hopper on the top, and the jet, with 1½-in. nozzle, set at one end. The description says that this jet washer was found to be a more efficient disintegrator than the log washer.

What the Hydraulic Elevator Is

We now come to the hydraulic, or jet, elevator which has been spoken of as both an elevator and a disintegrator or scrubber. It consists of two parts, a nozzle to admit the high-pressure water from which the power to elevate is obtained, and a "throat." In the simpler form, this throat is merely an extension of the discharge pipe. The position of the nozzle as regards the throat is important in the working of this machine, and the finding of the best position of the nozzle is the only adjustment required. Figs. 3 and 4 show two forms of this machine. The first form is very simple, such as anyone can make from ordinary pipe and fittings and by using ordinary pipe tools.

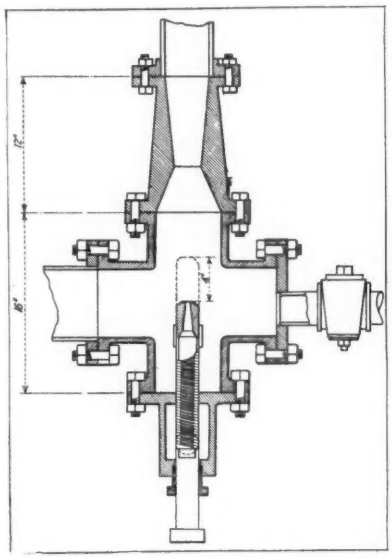


Fig. 4—Another form of the jet elevator. This is the real machine

The nozzle is drawn down from a piece of pipe in a forge, and the hole at the end cleaned out by running a drill through it. It should throw a solid stream, not a spray, in order to work well. The adjustment of the nozzle is provided for by running thread on the nozzle pipe. It may leak a trifle at first, but a small leak is of no consequence.

The writer has found this jet, although simple and rather crude, very useful around plants where mixtures of sand or clay and water had to be lifted or agitated. He has constructed a great many of them for temporary use in places where it would not pay to install a pump and where a low efficiency did not particularly matter. The device is what the workmen call a "handy little trick" that will often help a man out of a hole, and its use is recommended with that end in view.

The other form is a real machine, calculated for more efficient work and made with some care. The nozzle, of hard tool steel, is made to give the greatest efficiency to the issuing jet. The throat, of steel or chilled cast iron, resists the wear that comes

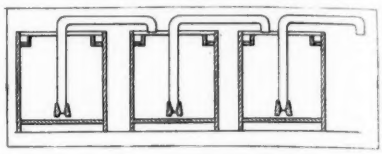


Fig. 5—This sketch shows the three jet tanks in series

from passing the stream through it at a high velocity. Suitable arrangements are provided for adjusting the nozzle with glands and stuffing-box to prevent leakage. This machine—put out by several manufacturers—is employed not only in mining and washing operations, but in handling dirt from excavations, especially where a supply of water under a good head can be obtained cheaply.

The principle upon which it operates is similar to that of the steam injector used for boiler feeding, which it much resembles in appearance. In fact, one manufacturer of a well-known steam injector formerly put out a jet elevator especially for use in sand and gravel washing. The principle of the machine is that a small jet of water issuing at high velocity will transfer its force to a larger quantity of water, causing the larger quantity to move through a pipe at a proportionately lower velocity. The throat is the means by which this transfer of energy is accomplished. It may be noted in passing that this throat has about the same lines as the venturi meter.

It must be admitted that as a pump or elevator *per se*, the jet elevator has a low efficiency. According to the text books, its energy is about 20 per cent, but a properly built and designed hydraulic elevator will do considerably better than that.

Considering it as a washer or scrubber, it is evident that it will function well in that respect, as a glance at the figure will show that all the material has to be passed

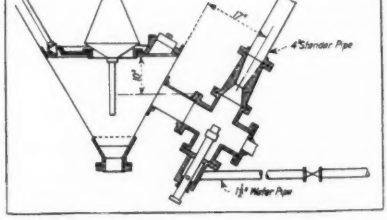


Fig. 6—Here the jet elevator is combined with the hydraulic classifier

through the throat, where it is subjected to the force of the jet and where the grains are crowded together and rub on each other as they pass. Experience shows that it is

just as efficient a scrubber as its appearance would imply.

It has been applied in a great many ways, of which a few are illustrated here. The first of these is the "jet tank" used in washing the sands of phosphate rock in the Tennessee field. These tanks are set in series, so that the discharge of one is the feed of the next in the series. Three such tanks in series are used in two of the plants in this field. An overflow is taken off from each tank; the overflow from the last contains only a small proportion of the original clay. The discharge from the last tank is sent to a dewatering device.

This method of washing is to remove the clay by a succession of washes, which was discussed in Rock Products of March 25, 1922. It is a much more efficient way of using the water than washing by a single wash, as was proven in that discussion, but not so efficient as the removal of the clay by displacing the water which has the clay in suspension by clean water, the method used in the device shown in Fig. 5.

In this device the jet is not connected

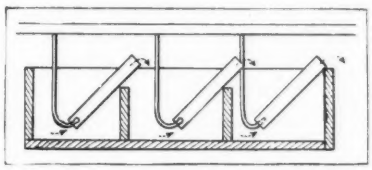


Fig. 7—A series of jets that feed one into the other. Made of 2-in. pipe, with a small pipe for the nozzle

with the main tank in which the sand is settled, but with a water chamber below that tank. This chamber is supplied with clear water under just enough pressure to hold back the clayey water above, but not enough to prevent the sand from settling into the clear water by its own weight. The sand and clear water are drawn up by the jet elevator and the sand is scrubbed in passing through the throat. The clay scrubbed off is removed by the overflow of the dewatering device to which the sand is sent.

In washing the silica sands of the Oklahoma field both the jet elevator and double hydraulicking are employed. At one plant the sand is mined hydraulically and flows with the water used to a steam pump which pumps it to large wooden tanks at the head of the plant. These tanks are provided with an overflow which serves to remove the greater part of the clay. As soon as a tank is filled the feed is changed to another tank and the settled sand in the first tank is sluiced to a "washing box" of local design.

This box contains a series of jets so placed that one will feed into the other; they are very simply made of 2-in. pipe, with a small pipe for the nozzle. Since they do not have to lift through any distance, their efficiency as elevators is of no consequence. All that is asked is that they shall scrub the sand in passing. Final scrubbing and rinsing are given in screw washers of the usual type found in silica-sand plants.

The jet elevator has reached its highest development in the hydraulic mining field in which it was first developed. This elevator is made in very large sizes for use in these fields, some of the installations being large enough to pass a boulder through the throat the size of a man's head. In ordinary washing plants, however, much smaller sizes are employed, and the jet elevator must be preceded by a screen to keep oversize pieces from entering. A 6-in. jet elevator has a throat 2⅝ in. in diameter at the point where it is narrowest, and hence the largest piece fed to it should not exceed 2 in. Even 2-in. pieces will clog if several pieces try to pass at the same time.

While the use of jets, both plain jets and jet elevators, is not limited by the ordinary conditions to be found in sand and rock-washing plants, the place in which they would seem to be of the most value is where they can be employed as preliminary washers of the crude material. The next best place is in the scrubbing of fine sands, as in some of the devices just described. These jets are not as much used as they should be, for in many cases it is possible to obtain water so cheaply under sufficient pressure that they are the most economical machines to operate as well as to buy and install.

(To be continued)

Bates Road Tests

THE final tests of the Bates experimental road are continuing successfully, states Secretary Yeoman of the Indiana Sand and Gravel Producers' Association. On May 19 the 3500-lb. per rear wheel loading was applied 2170 times and that same night the first of a series of 1000 night applications was made. These tests are expected to develop some interesting facts because the monolithic types are known to curl up slightly at the edges during the night, due to temperature stresses.

The conclusion arrived at at the end of the first 1000 applications of the 3500-lb. load are further verified—that is, surfacings are not showing any wear or failure except where the foundation has given way. The 4 and 5-in. macadam bases have been found to be entirely inadequate for bituminous and brick surfaces.

However, a 4-in. plain concrete slab on 4 in. of macadam has not yet shown any serious weakness, one corner only being cracked off. The bituminous types with macadam bases are developing depressions in the wheel tracks. The 3-in. brick with 4-in. macadam, and the same with 4-in. novaculite, have broken up badly and must be kept in constant repair by the addition of maintenance materials. The 3-in. brick with cement grout filler and 2-in. concrete base is cracking badly and in one place is broken through.

Sections made up of brick with asphalt filler sand cushion and concrete base occasionally show a displaced brick, due probably to the sand escaping through the cracked base, leaving the brick unsupported. A 5-in. plain concrete slab shows no failure except a few temperature cracks that occurred last winter. All concrete sections are in fairly excellent condition so far as traffic failures are concerned, except those sections in which patented chemicals or adulterants such as calcium chloride and hydrated lime have been added. These sections are showing up half good and half bad, a condition which is at present inexplicable.

"My conclusions of the results of the test to date," says Mr. Yeoman, "further convince me of the extravagance of providing a special material to case-harden the top of hard surfaced roads, and also that most of the failures in all hard surfaced roads today are due to weak and improperly designed bases and foundations."

When Lime Makes Concrete Stronger

THE Illinois state highway department recently completed a series of 60 day tests with hydrated lime of various percentages incorporated into concrete mixes. These tests, according to the department's report, show that this material can be used to good advantage under certain conditions. The results of these tests indicate that the effect of the lime on the strength of the concrete is dependent upon the fineness of the sand used in the mix. If a fine sand is used the lime does not add strength, but if a coarse sand is employed a more dense concrete is obtained and additional strength results. The results of the compression tests show that this is true, but neither gradation of sand containing lime showed added strength in the transverse tests. As the transverse strength determines the value of concrete in road surfaces an increase in this strength is more to be desired than an increase in compressive strength.

In addition to the strength tests on specimens containing lime, tests are being made to determine the stabilizing value of this material in concrete. Under alternate wetting and drying conditions the action of the test specimens are being carefully observed.

Mineral Aggregate Specifications for Asphalt Pavements

By Roy M. Green
Manager Western Laboratories, Lincoln, Neb.

The physical properties essential to success. Surface mixtures are dependent upon the type of mixture contemplated. Universal specifications are impracticable

MANY of the other details involved in arriving at satisfactory standard specifications for the construction of the various types of asphalt pavement are much simpler of solution than that of drawing up a suitable standard for the requirements of the mineral aggregates which might be universally adopted. For example, the asphalt cements that have been successfully used for the various types of work have been classified and placed in suitable groups for description in specifications and their physical properties are carefully controlled by the producers.

Physical and Chemical Properties

Since the physical and chemical properties of the successful asphalt cements are known—and there are relatively few producers of such materials—it is much easier to arrive at a suitable specification for them than is the case with the mineral aggregates where there are just as many different classes of materials as there are deposits of rock and gravel and their properties cannot be controlled further than to regulate the maximum size of the particles and the variation in sizes.

Realizing these facts, it is readily appreciated that the materials available for use for any type of pavement in the different sections of the country will vary through a wide range. Since it is always desirable to obtain the best material in each locality, if it can be done economically, it is impossible to draft a standard which will be suitable for all parts of the United States. For these reasons, I believe that the standardization of the specifications for the aggregate to be used in the various asphalt pavement mixtures should not be arbitrarily drawn, especially since there is a tendency of many engineers to adopt standard specifications blindly without regard to local conditions of supply or local experience with materials that have been used successfully.

A standard specification for aggregate is of no value except as a guide in drafting specifications for local conditions and as a means of pointing out to the average engineer those points which should be taken into consideration in the description of materials desired for a specific purpose. The adoption of a standard specification in its entirety often shuts out some local material of considerable merit, and in some cases may entirely shut out a type of construction by placing unnecessarily rigid requirements on certain materials that are essential for that type. In other words, standards for the requirements of the physical properties of aggregates should be based upon the materials available in any locality and should be so drawn as to admit all aggregates that have proven successful in like construction in the past, and should be strict enough to exclude all materials that have proven inferior.

Limiting Test Requirements

It is my intention to discuss the physical properties that are essential to the success of the various aggregates for use in the different types of construction. The definite limiting test requirements given are not intended for universal application; they are what I consider good practice for the materials available for use in Nebraska and adjoining states.

Since the properties of the mineral aggregate essential to the success of a bituminous wearing surface mixture are dependent upon the type of mixture which is contemplated, it will first be necessary to designate the types which are to be discussed.

For our purpose the asphalt paving mixtures will be divided into four classes:

1. Sheet asphalt wearing surface mixtures.
2. Asphaltic concrete, with the material passing the 10-mesh sieve predominating.
3. Asphaltic concrete, with substantial proportions both passing and retained on the 10-mesh sieve.
4. Asphaltic concrete, with a preponderance of material retained on the 10-mesh sieve.

Sheet Asphalt Wearing Surfaces

The function of the aggregate in a sheet asphalt wearing surface mixture is simply to furnish a medium whereby a high percentage of bitumen may be carried and still produce a mixture with density sufficient to prevent the entrance of water, toughness and elasticity sufficient to prevent cracking and spalling of the surface, and rigidity sufficient to prevent rolling and waving.

Combination Best Secured

Through a long experience with this type of mixture it has been learned that this sort of combination can best be produced by means of a mixture of properly graded sand, with the addition of a suitable amount of portland cement or limestone dust. Any properly graded sand made up of particles of sufficient toughness will meet the requirements for sand for this type of construction provided it is clean and does not contain too much material passing the 200-mesh sieve. The portland cement or limestone dust is simply added to fill the smallest voids in the aggregate combination, thus promoting stability, and to increase the toughness of the mixture through the fact that the asphalt cement is absorbed by this aggregate to a large extent. Experience has also shown that very fine sand in large amounts will not replace the portland cement or limestone dust as a filler, but is in fact undesirable. This point should be covered by the specifications.

Grading Specifications

Since the finished product desired for this type of construction is known, it is not necessary to specify the grading of the sand desired and subsequently repeat this in the specifications for the finished mixture, as is so often the custom.

This being the case, it is only necessary to specify that the sand shall be clean, hard and durable, the grading being given on the formula for the finished mixture. The amount of material passing the 200-mesh sieve should be limited. The description of the sand could be as follows in the specifications:

"Sand for Wearing Surface Mixture." The sand for the wearing surface mixture shall consist of clean, hard, durable grains, free from clay, loam and other foreign matter. Not more than 6 per cent of the sand for the wearing surface mixture shall

pass a 200-mesh sieve and it shall be so graded as to produce a wearing surface mixture as hereinafter specified under "Composition of Wearing Surface Mixture" when combined with the mineral filler and asphalt cement.

Since the mineral filler in the mixture adds to its toughness by assisting in retaining a larger proportion of bitumen, by absorption, it is essential that it be fine enough to act as a true filler. The description of the filler could be given in the specifications as follows:

"Mineral Filler." The mineral filler shall consist of limestone dust or portland cement which when tested by means of laboratory screens shall meet the following requirements:

	Pct.
Passing 40-mesh sieve	100
Passing 200-mesh sieve, not less than	75

If this type of specification is used for the mineral aggregate it then becomes necessary to give a complete formula for the desired finished product. The following is suggested as being suitable:

"Composition of Sheet Asphalt Wearing Surface Mixture." The materials entering into the wearing surface mixture shall be combined in such proportions as to produce a mixture conforming to the following limits of composition, by weight:

	Pct.
Bitumen	9.5 to 12
Aggregate—	
Passing 200-mesh sieve	10 to 16
Passing 100-mesh and retained on 200-mesh	5 to 20
Passing 80-mesh and retained on 100-mesh	5 to 20
Passing 40-mesh and retained on 80-mesh	20 to 40
Passing 10-mesh and retained on 40-mesh	15 to 45

The finished mixture shall have not less than 30 per cent of aggregate passing the 80-mesh sieve.

Although these specifications have been reduced to a simple statement of requirements, it must be understood that the aggregate grading must be carefully controlled, within the limits given, by some one competent to supervise this type of construction.

Passing the 10-Mesh Sieve

In this type of construction, which includes the Topeka mixture, a small amount of stone is introduced in the mixture of fine bituminous mortar. The purpose of this stone in the aggregate is simply to reduce the cost of construction by reducing the surface area to be coated by the asphalt cement, since it requires much less bitumen to thoroughly coat the stone which is replacing a like volume of fine aggregate. The large aggregate in this type of mixture does not contribute to its stability in any way as each particle is completely surrounded with the fine bituminous mortar and the larger particles are never in contact with each other. The success of such a combination is then dependent upon the correct proportioning of the finer particles of aggregate the same as in the case of the sheet asphalt wearing surface mixture. For this reason it is just as essential to produce a properly graded material having the same physical properties as the material used for the fine aggregate in the sheet asphalt. The specifications for the sand to be used in this type of construction should therefore be the same as for sheet asphalt.

Maximum Size Needed

The large aggregate is exposed in the surface of the pavement over a relatively small area of the total and it is therefore not so essential that the particles be as tough and hard as for use in mixtures where a large area is exposed in this way. It is also absolutely essential that the maximum size of these particles should not exceed ½ in. in diameter as they are entirely surrounded by a bituminous mortar. If the size is great, there will be a much greater tendency for movement in the mixture due to stresses at their edges.

In drawing specifications for the aggregate entering into pavements of this class it is well to specify limits of toughness and resistance to abrasion as well as requirements for cleanliness and a limit to the maximum size. The properties of the local materials successfully used should be kept in mind in order that those materials giving satisfactory service may not be eliminated by requirements that may be too strict. If this type of mixture is contemplated, the following specifications for the coarse aggregate are suggested:

"Stone." The crushed stone shall be produced from rock having a French coefficient of wear of not less than 8 and a toughness of not less than 8 when tested in accordance with the methods described in Department of Agriculture Bulletin 347. The crushed stone shall be reasonably uniform in quality and free from soft or disintegrated particles and shall vary from ½ in. to the smallest particle retained on the finest mesh screen commonly used in stone-crushing plants.

The specifications for sand and mineral filler should be the same as for sheet asphalt wearing surface mixtures as they serve a like purpose in this type of construction and should therefore be identical.

Formula for Completed Mixture

When this type of specification is used to describe the aggregates it is then essential to give a complete description of the formula for the completed mixture. A good specification, in very common use, is as follows:

	Pct.
Bitumen	7 to 11
Aggregate—	
Passing 200-mesh sieve	5 to 11
Passing 80-mesh and retained on 200-mesh	10 to 25
Passing 40-mesh and retained on 80-mesh	11 to 36
Passing 10-mesh and retained on 40-mesh	7 to 25
Passing ¼-in. screen and retained on 10-mesh	11 to 25
Passing ½-in. and retained on ¼-in.	5 to 10

Passing and Retained on 10-Mesh Sieve

When Mixture Is Used as a Wearing Surface. When properly designed, this class of mixture produces a dense asphaltic concrete with a high percentage of well-graded stone, the particles of which are in very intimate contact with each other. The function of the stone in this mixture is to add to the stability of the combination by interlocking, and to reduce the surface area to be coated with asphalt cement and thus reduce the cost of construction.

In order to be satisfactory in this aggregate the stone must have sufficient toughness and hardness to resist the internal wear that may be set up in the mixture as well as withstand the shocks of traffic that come directly upon the surface of the pavement. For these reasons it is essential that the stone be harder and tougher than that used in the preceding class of asphaltic concrete.

The mortar surrounding the particles of large aggregate in this combination must be suitably designed and proportioned also, in order that it may protect the large aggregate by holding it securely in place and thus help prevent internal wear. The mortar must also cushion the effects of traffic on the surface so that the shocks will not be great enough to completely crush the large aggregate. To accomplish this purpose the sand must be properly graded the same as in the two preceding classes of pavements. The following clause will cover these details.

The Coarse Aggregate

"Coarse Aggregate." The mineral aggregate shall consist of hard crushed stone or an approved mixture of hard crushed stone and gravel for the coarse aggregate. Not less than 90 per cent of the coarse aggregate shall pass a 1-in. screen. To the coarse aggregate shall be combined sand or a mixture of sand and fine stone screenings for the smaller sizes. The large aggregate, or that portion of the mineral aggregate larger than ¼ in. in diameter shall be composed of stone or gravel, all of which has been produced from materials having a French co-efficient of wear of not less than 10 when tested in accordance with the methods described in the Department of Agriculture Bulletin 347, page 4. All the crushed stone larger than ¼ in. in diameter shall be produced from materials having a toughness of not less than 10 when tested in accordance with the methods described on page 11 of Bulletin 347.

The coarse aggregate shall be reasonably uniform in quality and free from soft or disintegrated particles, or other objectionable matter occurring free or as a coating on the aggregate, and free from an excess of flat or elongated pieces.

When this type of specification is used it is necessary to also give the formula for the mixture desired. The following is suggested:

"Composition of Dense Bituminous Concrete Wearing Surface Mixture." The dense bituminous concrete wearing surface mixture, produced in the manner hereinbefore set forth, shall contain the following percentages, by weight, of bitu-

men and aggregate, the sieves being used in the order named:

	Pct.
Bitumen	5 to 8
Aggregate—	
Passing 200-mesh sieve	4 to 10
Passing 80-mesh and retained on 200-mesh	4 to 14
Passing 10-mesh and retained on 80-mesh	18 to 30
Passing ½-in. screen and retained on 10-mesh	24 to 35
Passing 1-in. and retained on ½-in. screen	20 to 38
Passing 1¼-in. and retained on 1-in. screen	0 to 10

The finished mixture shall have from 55 to 70 per cent of mineral aggregate retained on a 10-mesh sieve, and not less than 10 per cent passing an 80-mesh sieve.

Mixture as Closed Binder

When Mixture Is Used as Closed Binder in Sheet Asphalt Construction. When mixtures of this class are used as closed binder in sheet asphalt construction, the combination is made up of a mixture of fine and coarse aggregate with asphalt cement, without the use of the fine filler of portland cement or stone dust. The function of the coarse and fine aggregates are the same as in the case where it is used as a wearing surface. The large aggregate, however, need not be nearly so tough and hard since the shocks of traffic never come directly upon it and there is no possibility that there will be internal wear as the combination is always protected by a layer of fine bituminous mortar to a depth as great as 1 or even 2 in.

The requirements for the sand should be the same as for other types of construction, although the stone may be much softer. A suitable specification describing the stone might be as follows:

"Stone for Binder Course." The stone for the binder course shall be produced from tough and durable rock having a French co-efficient of wear of not less than 6 when tested in accordance with the methods described in the U. S. Department of Agriculture Bulletin 347, page 4. It shall be reasonably uniform in quality and free from foreign substances. When tested by means of laboratory screens it shall meet the following requirements and be uniformly graded between the limits given:

	Pct.
Passing 1-in. screen, not less than	95
Passing ¼-in. screen, not more than	10

Material on 10-Mesh Sieve

When Used as a Wearing Surface. This type of mixture is made up of a commercial size of broken stone mixed with a bituminous cement. The mixture thus produced is not an absolutely dense solid and no attempt should be made to fill the voids with the asphalt cement. The stability of the mixture is almost entirely dependent upon the interlocking of the large aggregate, and the wearing qualities of the surface are almost entirely dependent upon the hardness and toughness of this material. For this reason it is absolutely essential that this material be as tough as possible in order to withstand the shocks of traffic and resist the effects of internal wear which is inevitable when this type of mixture is used.

The limits of the properties of the mineral aggregate that should be specified are dependent upon the amount of traffic that must be carried by the surface. If it is absolutely known that the traffic is to be composed entirely of rubber-tired vehicles and is very light, it is safe to allow the use of much softer rock than if the amount and nature of the traffic are unknown or known to be severe and to consist of a large proportion of iron-tired vehicles. If severe traffic is contemplated it is necessary that the aggregate should be better than for any other type of asphaltic concrete mixture inasmuch as the aggregate must be of quality capable of carrying all the wear of traffic, including internal wear and abrasion of the surface.

A reasonable specification for this type of material is that recommended by the American Society for Municipal Improvements in 1917, which is as follows:

"Tests." The broken stone shall be subjected to abrasion and toughness tests conducted by the engineer in accordance with methods adopted by the American Society for Testing Materials, August 15, 1908. The broken stone used for the construction of the wearing course shall show a loss on abrasion of not more than 3.5 per cent or a French co-efficient of wear of not less than 11.5 and its toughness shall not be less than 13.0.

Open Binder in Sheet Asphalt

If this class of mixture is used as an open binder for sheet asphalt construction the requirements of the aggregate are the same as for the aggregate for closed binder, already described.

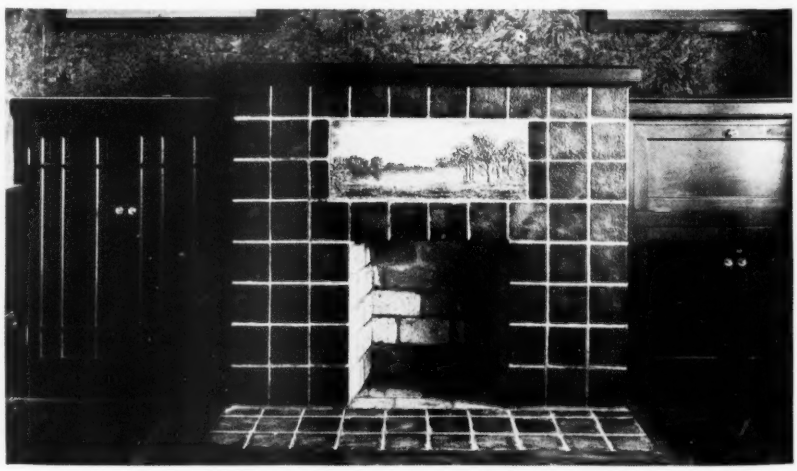
Conclusions

In closing I wish to again draw your attention to the fact that it is not good policy to recommend, for universal adoption, a specification for the mineral aggregate for asphalt pavements and place limiting tests requirements on these materials because materials differ so widely in nature in different localities and it is always advisable to draw those specifications which allow the use of only the best materials available in any locality so long as competition is obtained and the interests of economy served. While the specifications quoted are not intended for universal adoption, it should be noticed that the large aggregate should be of better quality for the cheaper types of construction than for the more expensive, the last form of asphaltic concrete requiring the best large aggregate while sheet asphalt binder and also Topeka may be constructed by the use of poorer grade of stone.

For successful results with any specifications it is also absolutely essential that the mineral aggregate grading be controlled within very narrow limits by one who understands the fundamental principles underlying the various asphalt paving mixtures and who is experienced in their construction.

Concrete as a Base for Mantel Tile

A NEW kind of tile for mantels, vestibules, fireplaces and the like consists of a cast concrete back or base, to which a glaze-like surface of any color desired is added by a special process, invented and patented by L. Torno. As can be seen by the illustration, Mr. Torno's invention provides a new application for cement which is said to have proven exceedingly satisfactory by the manufacturers of the new product, a company located in Berkeley, Calif.



A stock fireplace made with the new tile, a concrete tile having a face of any desired color, resembling a baked glaze

Limestone Versus Lime

Producers of limestone and of lime, believing themselves competitors of each other, really should be co-operators. It is such frank statements of differences of opinion as the following which will help the two to see the relative advantages of their respective products, and the need of each for working with the other. This co-operation is as necessary in other than agricultural uses of the two products

A DISCUSSION of the relative merits of lime and agricultural limestone, and of the value of fineness in agstone, which took place at the meeting of the National Agstone Association in Columbus on April 12, has resulted in some interesting correspondence between two of the speakers of that day. These two men are Dr. Charles E. Thorne, chief in soil fertility at the Ohio Agricultural Experiment Station, and L. S. Taber, director of the Ohio State Department of Agriculture.

Lowest Cost in Dollars Per Acre

The first letter, from Mr. Taber to Dr. Thorne, opposes the plea of the experiment station man for greater fineness of agricultural limestone. The letter in full follows:

"I know it is presumptuous for one who has 'sat at the feet of Gamaliel' and listened to the law of agricultural limestone to offer a suggestion to those of greater age, experience and wisdom, and far greater scientific knowledge, but I do feel after listening to you and Professor Bear that a word of caution might be permissible.

"It seems to me, as a practical farmer and user of agricultural limestone for many, many years, that there is, in the continued advocacy of greater fineness, a tendency away from the practical. What the farmer wants is not to sweeten his soil with the least amount of lime, but to sweeten and correct his soil at the lowest cost in dollars per acre.

"I have never liked the very finely pulverized limestone for two reasons. First: the great difficulty in handling. Second: the added cost. I am wondering if the farmer can afford to pay for the coal necessary for the heat and extra power in getting limestone so that it will all pass a 100-mesh screen. One of the limestone men gave some startling figures when he said that 'it would take three times as much horse power per hour to make limestone so that 95 per cent would pass a 100-mesh screen, as compared with 30 per cent to pass a 100-mesh screen.'

"In addition, there is the expense of drying, sacking and the added difficulty of storage and drilling on the farm. When limestone is so fine that it must be shipped in paper sacks, it brings a real difficulty to the average farmer in handling it. He must haul it, store it in the barn or shed where it will not get damp or the sacks get broken; unless the car comes in just when the ground is ready for distributing the lime on the field.

"It is very difficult to pile finely pulverized limestone in the field on the ground, because a week's wet weather will sometimes make it impossible to drill or distribute evenly.

"Last year I received a car, of which I think practically all went through a 10-mesh screen and 29 per cent through a 100-mesh screen. Limestone of this character can be piled in the field, and in favorable weather can be shipped in open cars, is easier to unload, easier to handle, and does not get so damp that it cannot be drilled even after there has been a little wet weather.

"The point I am trying to make is simply this: what we want to find is the cheapest price per acre at which the farmer can correct his soil acidity. In our sandy soils in Eastern Ohio that are very acid I like to lime about two tons per acre once every five or eight years, and like to do it in the most economical manner, both as to time and cash outlay.

"Do not misunderstand me. I feel that it is the duty of the Department of Agriculture (which is not a research department) to follow the instructions of the experiment station and university; and while I doubt if it is ever wise to encourage the use of screenings unless they are very fine, I do feel that there is danger in insisting on fineness until the cost is so high that the farmer will use coarse screenings, or will not use as much lime as he should. Ohio farmers should use lime by the million tons. It will make for the happiness and prosperity of all of us."

To this letter Dr. Thorne has replied:

"You know that it is very difficult in a 10-minute talk to get in all the points one would like to make so as to be thoroughly understood. I am therefore enclosing something written some time ago as a part of the book or general bulletin I am preparing on this subject, from which you will see that I have not advocated anything very much finer than that which you are using.

"The whole question in the ultimate analysis must be settled on the basis of practical cost, taking into account the points you have suggested; namely, the greater expense of grinding the fine material, the difference in convenience of distribution and the final effect on the crop. It is a question which will require figuring out independently for each separate farm."

Why Burned Lime Seems More Effective

The paper referred to by Dr. Thorne follows:

When either quicklime or hydrated lime is mixed with moist soil it immediately combines with the carbon dioxide which soil always contains, and reverts to the carbonate, but its particles are so small as to render them much more quickly soluble in the soil water, or in the dilute nitric acid produced by the nitrifying bacteria, than the coarser particles of the ground stone, and hence the greater effectiveness of the stone that has been burnt over that used in the raw condition.

The hundred tons of chalk that it is supposed were spread over Broadbalk Field more than a century ago, under the crude methods of pulverizing that were then available, probably contained no more immediately effective lime than would have been found in a single ton of quicklime; but this great dressing has furnished a supply that has slowly become available, year by year, for a century, and it may sometimes be advisable to use a coarsely ground limestone rather than the finer material, if only the fact be kept in mind that it is only the fine material that will give immediate results.

This question has been very thoroughly investigated by Nicholas Kopeloff, whose conclusions, based upon personal experiment and a comprehensive review of the literature of the subject, and published in *Soil Science* for July, 1917, are that increase in fineness of division of pulverized limestone is responsible for a proportional increase in crop yield, and that limestone that will pass a 200-mesh sieve may be regarded as equally effective with burnt

lime, pound for pound of calcium and magnesium contained.

Possible waste of lime: The familiar fact that drainage water is usually "hard" from lime held in solution suggests the possibility that excessive applications of lime in an immediately available form may result in considerable waste, and because of this possibility and of the greater cost of very fine grinding many investigators recommend the use of stone ground to a medium degree of fineness, in cases where it may be more economical to make larger applications at less frequent intervals than smaller ones more frequently. Another factor, however, must be considered here, and that is that on previously unlimed land it seems to be necessary to make a sufficiently large application of lime to completely neutralize the acid condition. Thus in a field experiment on the Strongsville farm of the Ohio Station the 13-year average annual increase from 1 ton of limestone of medium fineness had the following relative values, a total of 12 tons having been applied in each case, the crops being grown in a 3-year rotation on three tracts of land, each crop thus being grown every year:

From 1 ton every third year	$6.33
From 2 tons every sixth year	7.62
From 3 tons every ninth year	8.17

The exact degree of fineness of the limestone used in this test was not determined, but it is probable that it would all have passed through a 10-mesh sieve and 20 to 30 per cent through a 100-mesh sieve.

In another experiment, on the Wooster farm of the same Station, two tons of finely ground raw limestone applied to corn in a 4-year rotation of corn, oats, wheat and clover, has increased the yield by a total value of $12.64, whereas the same quantity of the same limestone, divided equally between the four crops of the rotation, has increased the yield by only $8.05.

Limestone Screenings: The increasing use of broken limestone for macadamizing roads has led to large accumulations of material too fine for road purposes, which is offered at lower prices than that demanded for finely ground stone. At the Ohio Station an experiment has been in progress for seven years in which both materials are applied to corn in a 4-year rotation of corn, oats, wheat and clover, with the following average outcome per acre:

Treatment	Increase from Liming			
	Corn bu.	Oats bu.	Wheat bu.	Clover lb.
Fine limestone, 2 tons	9.48	1.00	1.88	1139
Coarse limestone, 2 tons	6.76	.01	1.16	703
Coarse limestone, 4 tons	8.22	2.04	3.93	994
Fine limestone, 4 tons	10.83	2.78	3.95	1193

If we compute corn at half a dollar a bushel, oats at one-third of a dollar, wheat at one dollar and hay at ten dollars a ton the increase on one acre for each 4-year period would have the following average values:

Fine limestone, 2 ton rate	$12.64
Coarse limestone, 2 ton rate	8.05
Coarse limestone, 4 ton rate	13.69
Fine limestone, 4 ton rate	16.25

From the total value of increase above shown is to be deducted the cost of the stone at the quarry, the freight, and the hauling out and spreading, the last two items being twice as great for the 4-ton as for the 2-ton applications.

Of the "fine" limestone used in this test about 35 to 45 per cent would pass through a sieve having 100 meshes to the linear inch, and all through a 10-mesh sieve. This is really a medium degree of fineness. The coarse limestone is the grade known as screenings, all of which passes through a quarter-inch sieve.

National Lime Association Convention to Be Held at Cleveland

"THREE days of inspiration and enjoyment" is the promise of the committee in charge of the coming convention of the National Lime Association at Cleveland, Ohio, beginning Wednesday morning, June 14, and terminating on Friday, the 16th. The convention will be held at the Hotel Statler.

A most interesting program will be had, and although it is only tenatively arranged as Rock Products goes to press, the program will be sure to include addresses and papers by the leading scientists and operators in the lime industry.

Among the topics to be considered will be the year's development in wet-mixed mortar, which is a coming proposition. There will be something new on lime in concrete. Leading users of chemical lime will tell what they would like from the lime industry. Agricultural lime will be discussed from a new angle. There will be illustrated papers on lime production and lime-handling problems. Free-for-all discussions will be featured on all topics. The business outlook and business will be given due consideration.

Says the association announcement: "All of us together: A family talk on making your biggest sales organization, the association, better serve your business. There will be things to entertain; things to divert—possibly a half-day boat trip down the lake with a clambake. There will be inspection as well as entertainment. May we count on you and your co-workers?"

It's almost needless to urge a big attendance at this Cleveland three-day meeting—the lime man's interest in all that pertains to making his business a better and bigger business has always been reflected in his active attendance at past conventions and meetings.

G. F. Loughlin in the West

A STUDY of 22 years' standing of the Leadville mining district in Colorado will soon be completed. G. F. Loughlin, geologist in charge, division of mineral resources, U. S. Geological Survey, passed through Chicago on May 17 on his way to Colorado, where in three or four weeks he expects to finish the field work of the present study. A few months of office work still remains before the report of the study can be published. Mr. Loughlin is well known to rock products producers, either personally or by reputation.

The first study of this famous and highly productive district, started in 1880, resulted in a report a few years later which was a classic; but later developments made the report inadequate, and a second study, started in 1900, has been going on, with various interruptions, until the present time.

Mr. Loughlin will also visit Aspin, another famous silver-lead mining camp of Colorado, and will investigate this camp in the light of more recent developments in the science of ore deposits.

Early in July Mr. Loughlin expects to make a short examination in Southern California of a peculiar and interesting area of altered anorthosite. This mineral is a lime-soda feldspar rock with unusual characteristics, and Mr. Loughlin will investigate the extent of the deposit.

Mexico Wants Cement and Construction Materials

IT is announced by the Mexican Chamber of Commerce, located in the Woolworth building, New York City, that among the products which Mexico would like to import from the United States are cement and construction materials. Among the directors of the chamber are James W. Gerard, Elbert H. Gary, Russel R. Whitman, J. S. Hess, consul-general and financial agent of Mexico, and others. A bulletin issued by the chamber lists 247 classifications of American articles and raw products which Mexico imports.

American Fertilizer Association Plans Meeting

THE convention committee of the American Fertilizer Association is at work on the business and entertainment program for the 29th annual convention of the society, which is to be held at White Sulphur Springs, W. Va., the week beginning June 12. Speakers will address the convention on subjects of importance to the fertilizer industry. The meeting headquarters will be located at the Greenbrier Hotel.

Accident Prevention

How to Avoid Yard Accidents—Part I

ALTHOUGH accidents may be less frequent in the yard than in other plant departments, yard accidents are usually more severe. Such accidents are not limited to yard workmen; many happen to plant workmen passing through the yard to or from their work, to truck drivers of outside companies, to railroad switchmen, and others. The yard foreman therefore is responsible not only for the safety of his own men but also for the safety of all who come into the yard. The importance of a carefully planned layout demands the close attention of every plant manager. The location of pathways, roadways, and switch-tracks should be carefully considered when planning new buildings or structures. If this is neglected until the building is completed, many serious problems of operation and safety will be encountered.

All roadways and walkways in the yard should be kept in good repair, free of debris and other obstacles. Well-defined walkways will encourage the men to use them and decrease the practice of walking on railroad tracks or taking "short cuts." In large plants, where it is necessary for pedestrians to cross railroad tracks, it has been found advisable to build viaducts or subways. If railroad tracks and walkways pass around the corner of a building, a passageway often may be cut through the corner of a building to provide a safe walkway. The use of railroad tracks as walkways should be prohibited.

Where buildings are situated near railroad tracks, or have doorways opening directly onto tracks, it is important that steps be taken for the protection of those who use such doorways. Electric signal gongs or lights are used in some such instances; in others, swinging gates are used; and still another method is to place a guard railing immediately outside the doorway. Where a gong is used, workmen may confuse this particular gong with others in the shop; therefore, the use either of a swinging gate or guard railing is preferable. Windows on the ground floor of buildings located near tracks should be closed by means of screens or metal bars, to prevent the employes from using them as means of exit.

Pits, Depressed Roadways, and Obstructions

All pits should be provided with snugly fitting covers, and the casing should be flush with the ground. Manhole and pit covers should not have handles cast on them; they should have handrings which fold flush with the surface; or the covers should be removed by use of ventilating holes. This eliminates a common stumbling hazard.

SAFETY BULLETINS

Safety bulletins on shop bulletin boards help develop the safety habit among workmen. Some plants have reduced accidents 75 per cent or more. This bulletin, 17 in. x 23 in., printed in bright yellow and a deep, rich purple, is but one of 36 safety bulletins distributed to members last month.

Isn't there an appeal in this bulletin? This family is but one of thousands, deprived of its breadwinner, left to struggle on in poverty. The father was merely one of the 22,000 persons killed in industry last year. Each accident leaves in its wake suffering and privation—often, widows and orphans.

HOW ABOUT YOUR PLANT?

Were there children left fatherless because of fatalities among YOUR workers? Wouldn't it give you a thrill of satisfaction if you were to go farther than the mere requirements of the law—if you were to do every possible thing to safeguard the lives and limbs of your workers and could thus prevent such scenes of distress as that pictured by these two helpless children?

This satisfaction will come to you by joining

The National Safety Council

Dept. R2

Co-operative Not-for-profit

168 N. Michigan Ave., Chicago

Write for sample bulletins to try in your plant.

Metal manhole covers give much better service than wooden ones. When made of metal, however, the surface should be checkered with a raised pattern, or made of a non-slip material, as many serious injuries have resulted from workmen slipping on smooth, wet manhole covers. Whenever a cover is removed a guard railing should immediately be placed around the hole and a danger signal secured to the railing.

Unloading Material

Many yard accidents occur while the workmen are unloading material. Cranes are used by many companies for unloading heavy material and their use eliminates many injuries suffered in hand labor. The crane operator should be alert and constantly on the lookout to prevent workmen from standing or passing under or near the line of travel of the load. This is especially important in the use of the electromagnet, because any interruption in the electric current will cause the load to drop instantly. Again, some piece of the load may be so held by the magnet that the least jar will break its contact and allow it to fall.

In unloading sand, gravel or other material by the use of the grab-buckets, and of metal stock by the electromagnet, many severe accidents have occurred when helpers have been caught between the bucket or magnet, and the side of the car. Such accidents can be prevented only by caution on the part of the workman and the crane operator.

Workmen are often struck by stones or other material being unloaded. When the cars are being unloaded near a passageway or walkway, a danger sign should be placed at each car end to warn pedestrians.

The dumping of hopper-door cars often causes severe accidents unless a "Safety" wrench; several satisfactory types are in use and the National Safety Council be glad to supply information about them. Gangplanks should be cleated on the under side to prevent them from slipping between the cars and the unloading platform. Steel pins dropped through the eyelets in the gangway and into holes on the unloading platform will hold the runways in place. The pins may be attached by small chains to the runways or to the platform.

Piling of Material

For the sake of economy as well as of safety, careful attention should be given to the piling of material. Neat, orderly piles conserve storage space, add greatly to the general appearance of the yard, and reduce the hazard of workmen.

Timber should be piled in an orderly manner. This greatly reduces the chance of accidents in handling as well as keeping it in proper condition.

(To be continued)

Quarried from Life

By Liman Sandrock

Mr. Lewis J. Bennett

IT isn't given to many of us in the rock products industry to be able to proclaim that not only were we active producers 'way back in the early seventies, but that today we have about us several of those selfsame employes who, forty and more years ago, began to give of their loyalty and devotion and are still tried and true friends and employes. If the majority of us could achieve this fine and most unusual record, wouldn't we be proud?

But Mr. Lewis J. Bennett, founder and active president of the Buffalo Cement Co., Ltd., of Buffalo, N. Y., can lay claim to this enviable record, for he is now in his 89th year! Let us dip a bit into his business history:

In 1872 Mr. Bennett, formerly a successful government and state contractor, organized the Buffalo Hydraulic Cement Co. Six years later the business had outgrown its location and he purchased 225 acres of quarry land a mile east of Main street, where he built a large plant and organized the present company. This company manufactured the Red Maltese brand of Buffalo cement, hydraulic lime and Buffalo portland cement. This latter cement was made by a process patented by Mr. Bennett and adapted to the clinker from the natural cement rock, which contained 20 per cent silica and 60 per cent lime. At this time there were only 12 other natural cement plants in this country and not one portland cement plant.

Some 30 years ago, when the cement rock was nearly worked out, there was a small and growing demand for crushed stone. As the overburden in this company's quarry contained a 25-ft. strata of unusually hard limestone, it was decided to build a crushed stone plant—one of the few in the United States.

Today, hundreds of miles of improved highways in western New York and northwestern Pennsylvania and the ballast in 19 different railroads attest the successful operation of this plant. Truly, a monument to Mr. Bennett's business acumen and vision!

And what manner of man is he who has accomplished so much? In the words of one of his associates: "The company has made wonderful progress ever since its inception. The character of its management has warranted the regard and admiration of the industry in general. It has a business of large proportions and output, and today is doing more than ever before in its history. Its future is very promising. All is due to Mr. Bennett! He is loud in his praises of the

Lewis J. Bennett, president of the Buffalo Cement Co., Ltd.

men who have stood by him and helped to build this solid business structure."

While Mr. Bennett "wears the silver livery of advised age," as the Bard of Avon has expressed it, his heart is still young and glowing for those who have been with him for the past half century, and he is giving credit to them for his success.

He spends the winter in St. Petersburg, Fla., but throughout the rest of the year he is the active, watchful president of the Buffalo Cement Co., Ltd.

Closely associated with him are Leslie Jay Bennett as vice-president and treasurer, Louise A. Wood as secretary, Charles A. Freiberg as general manager, Henry W. Young as office manager, and Fred C. Diebold as quarry superintendent.

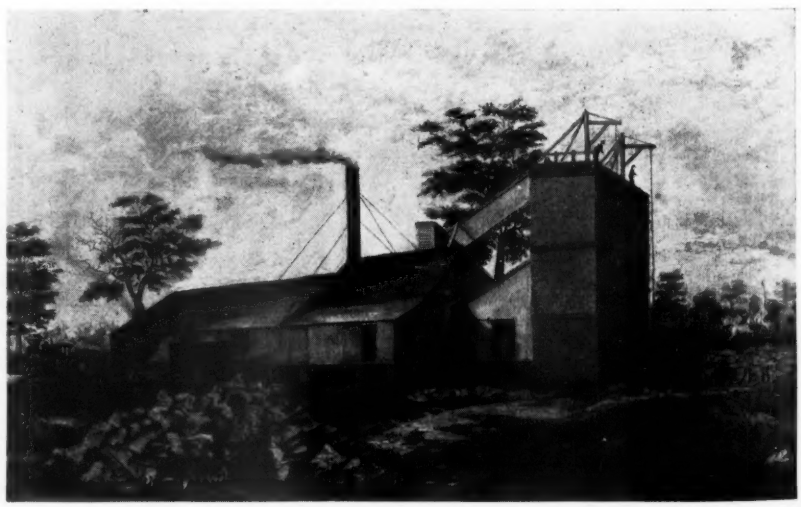
They Said It!

SECRETARY GRAHAM, Iowa Sand and Gravel Producers' Association: "There is no use trying to co-operate with a competitor if you are taking away from him his chance to exist and do his share of the business. Many business men get insane for a 'big volume' and go broke trying to get it, forgetting that a smaller business with good profits is by far the better way."

WESTERN PAPER says the local stone company is "awd cont in connec with erec of bldg." One is c2k if the offis cat clawd ther stuffin' outa this line, or if it's the reg guff of the bldg. trade rpts. Like our 4d, it hits on cyls 1 and 3 only.

Excavating Engineer says that the Malay States railways are carrying crocodiles, tigers and panthers, crated, for ½ cent per mile. Snakes in baskets go at parcel rates. Glad to know that somebody's getting a low freight rate these parlous times.

The *Topeka Capital*: "Why not a cement combine? It is the nature of cement to stick together."



How the Buffalo Cement Co. got its name. This natural cement plant was built in 1874. A wood-burning locomotive hauled the cars—and these box cars had a capacity of 20,000 lb.!

Editorial Comment

Sell Now

Business good most everywhere is the report from rock producing people. Cement output for April was high; crushed stone, gravel, and sand are needed to complete the concrete for highway and building construction. Other materials are in demand for construction. There's still time for aggressive selling to boost your 1922 sales high above the 1921 figure. But the season is well under way, and you can't let any grass grow under your feet. Now is the time to get out and sell.

Dangerous Competition

Associations representing producers of two competitive materials in the rock producing industries—which two is immaterial, there are several such pairs—recently gave evidence of an unco-operative spirit that is bound to harm the producers of both materials in the long run.

The bulletin of one association announces that the other organization, seeing the progress the first material is making, has greatly increased its efforts in promoting the material it represents for the same uses in which the first material is making progress.

Good, to a certain extent. Keen, clean competition is the life of business, and the man who profits most from such competition is usually the ultimate consumer. To the high-minded producer with ideals of public service directing his business this result is gratifying so long as his profits are satisfactory.

This spirit of competition, however, is hard to control. Competition on the merits of the product may soon turn into price competition, and when permitted to go too far will result in the failure of many weaker organizations in one or both industries. Then is the effect of lack of co-operation evident. Those who have failed see the mistake too late; those who continue have lost on low prices what even the later increased prices may not compensate; and the consumer, while he has profited temporarily from lower prices, suffers when prices rise again after the failure of the marginal concerns.

Boost—Don't Knock

If price competition doesn't enter seriously, there's another result which may affect adversely producers of both products and consumer as well. Both products, let us say, are meritorious and each has certain advantages over the other for similar uses. In his zeal for boosting his own product, one producer—or one association—may consciously or unconsciously, and fairly or unfairly, lay stress on the disadvantages of the second producer's product, and the second producer or association does likewise. The result is a loss of confidence in both materials on the part of the consumer, who turns perhaps to a third and inferior—for his purpose—material, leaving both competitors without his business and obtaining for himself less satisfactory results.

How much better to have co-operated; the combined resources of the two industries might have provided research funds that would bring to light important and profitable new uses of both products, instead of going for competitive publicity that harms both.

Hang Together—or Separately

Within an industry a situation may develop similar to that pictured above as between industries. That's about what happened to the slate people—time, money, and effort were spent individually to say "Don't buy his product; mine is better." The result was a steady decline in the industry until the formation of co-operative selling companies helped to reduce selling costs and remove some of the ruinous competition. Now with the formation of a slate association with plans for nation-wide publicity this excellent material should receive more nearly the consideration it deserves. Here again it's a case of pull together, this time within the association, that makes for mutual success.

Coal Strike vs. Aggregates

Most cement operators show little visible evidence of worry over the coal situation; in general they have a considerable supply on hand; enough probably to last two or three months. Besides, the move a couple of days ago of the coal operators toward a settlement of the strike is a hopeful sign for all who depend directly or indirectly on coal for the activity of their plants—and that is about everyone.

Nevertheless, there's no harm in giving some heed to the warning sounded four weeks ago in this column, and since repeated by the highway divisions of a number of states, that it is well to ship all the aggregates possible as early as possible. Even though cement plants will not be forced to shut down, at least for two or three months more, and thus hold up construction, the coal strike may end suddenly and the resulting demand for open-top cars for coal shipment will seriously affect the shipment of aggregates. Ship much and ship now! That's the safest thing to do.

Rate Situation in the East

BY means of its order in I. and S. No. 1534, issued April 29, the Interstate Commerce Commission has held up, at least until it can investigate, a new phase of the carrier and cement manufacturer competition in which the railroads and manufacturing companies have long been involved over the question as to proper rates from the Lehigh and Hudson producing districts, to New York Harbor and New England destinations, states *Traffic World*. In that order it suspended schedules filed by the Central of New Jersey, Lackawanna, Lehigh & New England, Reading, and Lehigh Valley, dated to be effective May 1, in which they proposed a reduction in the rate on cement from the Lehigh district to New Jersey tidewater points, for transshipment beyond, from 10 to 7 cents. The schedules were suspended until August 29.

Protest against the proposed reduction was made by the Atlas Portland Cement Co., on the ground that the reduction in the transshipment rate proposed would put cement from the Lehigh district into New England at rates so much lower, relatively speaking, than from the Hudson district, right at the west door of New England, as to make the lower rate a traffic scandal.

Coincidentally with the filing of schedules cutting the transshipment rate, the carriers filed sixth section applications for permission to make a rate on cement to New York harbor point deliveries of 11 cents instead of 14 cents. They did that so as to remove any question of fourth section violation that might be created by the publication of the 7-cent rate to the Jersey shore points for transshipment beyond. The possibility of fourth section violation was raised by the fact that their rate to New York proper was 14 cents. The transshipment rate of 7 cents to Jersey shore points would have made it possible to get cement into New York, in competition with that 14-cent rate, for 11 cents, the assertion being that lighterage from the Jersey shore points could be had for 4 cents.

The railroads serving the Jersey shore points proposed the reduction to them on the ground that they were losing revenue to which they were entitled by what they claimed to be the fact that the Hudson district mills were obtaining barge transportation, down the Hudson, that enabled them to bring cement to the Manhattan shore line for about 6 cents per 100 lb. and that a 7-cent transshipment rate to the Jersey shore would enable them to bring some cement from the Lehigh district to New York harbor points in competition with the barge service down the Hudson river. The barge service is not under the control of the commission. Rates for that kind of transportation are beyond its control. The commission, however, by suspending the proposed cut, declined, temporarily at least, to recognize the supposed competition via the Hudson as a reason for establishing a rate to the Jersey shore points, which when used for making rates into New York City and into New England, in theory, at least, would put the Lehigh cement into those regions at a lower freight rate than from the Hudson district.

The relationship of rates from the competing districts has been under consideration in a number of formal cases on the allegation of the Hudson mills that the rates from the Lehigh district into New England unduly preferred that district. The commission has not agreed with that contention. In those cases the Lehigh district contended that the barge transportation on the Hudson river gave the Hudson district an advantage more than offsetting the advantage the Lehigh mills were supposed to have by reason of the lower rates, considered on a mileage basis alone.

Spokane Company to Develop Big Phosphate Deposit

THE Phosphate Products Co., Spokane, Wash., is a recently incorporated concern which has secured rights to phosphate land adjacent to Philipsburg, Mont., estimated to have a deposit of phosphate rock a mile long, 12 ft. wide and at least 1200 ft. deep. The officers are Dr. James Sutherland, president; W. F. Wegner, vice-president; Charles G. Schrimpf, treasurer; J. Harry Wells, secretary, and A. M. Nash, director and engineer. The capital stock is $125,000.

New Developments at O'Neals Lime Works

THE O'Neals Lime Works, Eureka, Ala., have announced plans for a $350,000 office building to be erected in Birmingham. Several months ago the company moved its sales offices to Birmingham in order to keep in close touch with the building trades. For some time the plant has shipped up to capacity and it will shortly be increased to 2000 bbl. a day.

To promote the use of lime in the homes for small jobs and repairing, the company is packing lime in 5-lb. sacks as well as the standard 50-lb. sacks. So far this plan has proved satisfactory as a good market has been found for the small sacks.

Announcement has also been made that the Sandusky Cooperage and Lumber Co., Sandusky, is to establish a cooperage plant on the O'Neals property at Calera.

The officers of the O'Neals Lime Works are Dr. W. C. Gewin, president; W. W. Wood, vice-president; Dr. N. A. Barrett, secretary-treasurer; and E. M. Confer is the general manager of the Eureka plant.

Production of Gypsum in 1921

ACCORDING to conservative estimates made by the U. S. Geological Survey from the incomplete returns available April 1, the quantity of gypsum mined in the United States in 1921 was approximately 2,870,000 short tons as compared with 3,129,142 tons in 1920. The combined value of the crude and calcined gypsum sold was approximately $20,820,000 as compared with $24,533,065 in 1920.

Fortieth Year of Smidth & Co.

COMMEMORATING the 40th anniversary of the firm of F. L. Smidth & Co., an exceedingly interesting and attractive anniversary book has been published in the Danish language. This book which contains nearly 300 pages, traces the development of the cement industry along with the development of the Smidth organization. A large number of illustrations show pioneers in the industry and cement plants which have developed during the growth of the industry.

The founder of this organization, Verner Frederik Laessoe Smidth, was born in 1850 at Kerterminde on the island of Funen, the second largest island of Denmark. Mr. Smidth's father was mayor of the town in which he was born. The business was founded on January 2, 1882, as a technical bureau, handling principally the purchase and sale of second-hand engines, the erection of flour mill plants, and the planning of brick works. The flour mill industry declined and the brick work led the firm naturally to the installation of cement works. The first cement plant erected by the company was built at Linhamn in Sweden in 1888 and was soon followed by several Danish and other Scandinavian works. Between 1890 and 1895 branches of the organization were established at London, St. Petersburg and New York. During this time the tube mill was introduced.

Mr. Smidth died in 1899. Since then the business has been carried on by the two remaining partners, Poul Larsen and Alex. Foss.

Kansas Court to Determine Scope of Cement Suit

THE Kansas Supreme Court has been called upon to determine the scope of the state attorney-general's investigation of books, checks and correspondence of the Kansas cement companies in the anti-trust suits against the Ash Grove and other companies.

Colonel Dean, representing the defendant companies, said: "We have already spent $10,000 gathering statistics, records and information for the attorney-general in this case. We have offered to supply any records the attorney-general may point out. We have denied under oath that there has been any combination or illegal act in connection with the Le Hunt plant. Now we object to a general fishing expedition that will require us to bring a car load of records into this case for the attorney-general and his assistants to paw over in the hope of finding some evidence."

Colonel Dean pointed out that even though the information as requested should be supplied, it would be of no value to the state. He pointed to the fact that any act by the cement companies in 1916 and 1917 had been removed from court action by the statute of limitations long before the case was filed.

"If the attorney-general has the information in his possession as he positively states in his petition, a fishing trip is not necessary," said Colonel Dean. "He need not go through our books to get something to support his pleadings."

The application was taken under advisement.

South Dakota Freight Rates Lowered

SOUTH DAKOTA'S Board of Railroad Commissioners, in its recent report and order in the general investigation of building-material rates, established a new distance scale of rates on sand, gravel and crushed stone which, with a few exceptions, will result in substantial reductions on these products between all stations in this state.

The board also ordered a reduction in sand and gravel rates from pits near Sioux Falls to that city and on stone from quarries near Rapid City to that city. It also established a new system for the construction of joint rates on shipments of the commodities involved between points on different lines and its order requires the railroads to make these reduced rates effective on or before May 15.

These orders are the result of complaints of producers, manufacturers, contractors, the state highway officials and the Federal Bureau of Public Roads, that the rates were too high to permit a free movement of the commodities and that these rates are retarding construction work. The case was heard at Huron on March 30 and 31. The state commission's statistical and rate departments also introduced evidence that refuted the carriers' contentions.

Port Commissioner Carson

THE many friends and business acquaintances of William E. Carson, the president and general manager of the Riverton Lime Co., at Riverton, Va., will be pleased to learn that Mr. Carson has been honored by the governor of Virginia in the appointment as a member of the Hampton Roads Port Commission.

William E. Carson

The Hampton Roads newspaper has this to say of this new honor: "To his many friends in this part of Virginia the appointment of Mr. Carson is a source of much gratification. As a successful business man, an executive of proven capacity, Mr. Carson is admirably fitted for the duties of this post."

The big purpose of the Hampton Roads Port Commission is to make that port one of the greatest on the Atlantic coast. Before its work is completed, the commission will spend in the neighborhood of $20,000,000.

ROCK PRODUCTS, too, extends its hearty greetings to an old and valued friend and wishes him in his new work the same high degree of success he has attained in the rock products industry.

Cement Companies Have Not Restrained Commerce

IN the suit against the Atlas Portland Cement Co. and others, Federal Judge Knox in the New York Federal Court has dismissed the second count of the Sherman law indictment that the cement companies have been acting in restraint of commerce. The judge also ruled that he would direct the jury to acquit the Allentown Portland Cement Co., declaring that the inclusion of this company had been an error on the part of the government.

He also ruled that the evidence of one of the witnesses, formerly an employe of the Atlas Portland Cement Co., could be applied against only one defendant and not against the Atlas Co. or the others. The defense had asked that this witness's testimony be ruled out altogether, but Judge Knox held that the ruling out was a matter for the jury.

With the beginning of defense evidence, motion pictures were displayed to portray the manufacture of cement from the quarry to the clinker. The first witness was Charles E. Fernsler, an accountant, who introduced statistical charts on the cement industry, disclosing the profits made from 1913 to 1921 inclusive.

These figures showed that the 19 defendant companies annually produced 27,000,000 bbl. of cement, had a total capital of $150,000,000 and that the average net return for the nine years had been less than 5 per cent. The charts also disclosed that 200 lb. of coal had been used in the making of a barrel of cement, and that the cost of coal is, therefore, an element to be considered in adjusting prices.

Production of Phosphate Rock in 1921

ACCORDING to conservative estimates made by the U. S. Geological Survey from the incomplete returns available April 1, the quantity of phosphate rock sold in the United States in 1921 was about 1,968,000 long tons, valued at $10,928,300, as compared with 4,103,982 long tons, valued at $25,079,572 in 1920.

Florida's production was approximately 1,675,000 long tons, valued at $9,036,000. Tennessee followed with 293,000 long tons, valued at $1,892,300, which included a small quantity of brown rock from Kentucky. The Western States were represented by only one producer and South Carolina dropped out entirely.

The general business depression of 1921 is illustrated in the decline of the production of phosphate rock. The decrease in the selling price of agricultural products, combined with the high freight rates, prevented farmers from purchasing fertilizer, and the low rates of exchange discouraged exporters in the industry.

No Immediate Coal Shortage

IN spite of the strike, there is a general lack of demand for coal supplies throughout the country. At the present rate of production and consumption, says the Coal Bureau of the U. S. Chamber of Commerce, there is no danger of any general shortage for at least six weeks. The amount being mined at present is falling short of the consumption at the rate of 4,600,000 tons per week. To cover this deficit, we have 48,656,000 tons in storage. Stocks can drop around 20,000,000 tons without much danger of a panic. If, therefore, the consumer continues to draw from this storage at the present rate and there is no increase in production from the non-union fields, a shortage will be felt about June 15.

If the strike continues, the ordinary lines of distribution are likely to be disarranged and result in great variations in the ability of different communities to get their needed supplies.

Fire Underwriters to Test Concrete Building Units

UNDER the auspices of the American Concrete Institute the fire resistance of concrete building units is to receive official tests by the Fire Underwriters laboratories. Under present conditions the rate of insurance on buildings constructed of concrete blocks is the same as on buildings of frame construction. This has retarded the development of concrete building blocks and the sale of material for that use. These tests will indoubtedly show that the material is worthy of better consideration. The Indiana Sand and Gravel Producers' Association will give the matter its moral support and financial assistance.

Installing Air Separation System for Making Silica

THE Ballou White Sand Co., Millington, Ill., are completing the installation of a complete air separation system for the making of fine, dry silica, in mesh from 60 to 150 and can get a very close size in each mesh. This system makes a very high grade "banding sand."

Indiana Lets Cement Contracts

THE Indiana state highway commission has let contracts for 40,000 bbl. of cement to be used in constructing 10 miles of state road system. The contract was awarded to the Louisville Cement Co., at $2.48 delivered, less 10 cents a bbl. for the return of sacks.

The commission also has awarded the Universal Cement Co. the contract for 16,000 bbl. for another road stretch at $1.50 a bbl. It is understood that the commission has a preferential freight rate on the traction line in that territory. Under the present plans of the commission which provide that the commission shall furnish the cement for all concrete state roads, the state will purchase more than 200,000 bbl. this spring and summer. summer.

In Defense of Potash Producers

EXECUTIVE Secretary Frederick W. Brown, of the U. S. Potash Producers' Association, recently came to the defense of the potash producers in a letter to the Chicago *Tribune* taking issue with that paper on one of its editorials, "The Farmer and the Potash Tariff." Mr. Brown said in part:

> The American potash producers, with $30,000,000 invested in idle plants, with Germany dumping potash here below the pre-war price because of the export advantage incident to the constantly falling exchange value of the mark, have asked the Congress to protect them from this unfair competition for the brief period of five years. Nor is this all. The duty, moderate at first, is to diminish during the five years till it disappears entirely.
>
> The supplies of raw material here are practically unlimited. The published reports of the U. S. Geological Survey show that one salt pan in California could supply all our needs for potash for the next hundred years, that the leucite hills of Wyoming could do the same for 800 years, and that the Nebraska lakes can be relied on for an enormous tonnage for an indefinite period. Within the past year oil drilling in Texas has shown the presence, over an area 300 miles in extent, of beds of potash salt identical with the German beds in quality and probably in quantity.
>
> Your editorial fails to state that in 1918 we produced 109,606,000 lb. of actual potash, or something more than one-fifth of the country's normal consumption. The U. S. Geological Survey in 1919 estimated our producing capacity in plants then in existence at 100,000 tons, against a normal consumption of about 250,000 tons.

Mineral Technologist Ladoo Making Feldspar Investigations

THE mineral technologist of the Bureau of Mines, R. B. Ladoo, has spent several weeks visiting feldspar mines and quarries in the Western states. Mr. Ladoo has been gathering data intended to make available to all producers information as to improved methods of quarrying and preparing feldspar for market, with special regard to economy of production and elimination of waste.

Economic Status of Rubblestone

WHY supplies of Alton limestone are not carried in stock in a form where it can be used for blocks are thus explained in the *American Contractor* by Joseph C. Aldous, secretary of the Mississippi Lime and Material Co., Alton, Ill.:

> There was a time when rubblestone was generally used for building construction. It was once cheap and could be obtained quickly in any quantities. Many of the old houses in Alton are built of it. The principal factor in discouraging its use was the coming of cheap cement, which made it easy to pour foundations at a low cost. But there is no prettier foundation than rubble.
>
> Naturally the falling off in demand resulted in the companies that were producing it paying it less and less attention. It has not been largely used for the past 10 or 15 years. We cannot have piles of it lying about in our yards, where it would be greatly in the way. So we carry none in stock and only produce it as we have orders for it.
>
> The task of producing it is much greater than formerly, for most of the men that work in our quarries do not know anything about getting it out. We used to have Irishmen that had learned 30 years ago the details of getting out the rock. It requires skill. Powder can be used to loosen the rock, but mostly it is a case of barring it out. The chipping into exact shape is done on the building job.
>
> In 1920 we had an order for a considerable quantity for an orphanage being built in Alton. We found that we had no men familiar with the processes of getting the rock out of the quarry. But we found in St. Louis some foreigners from the south of Europe who had been doing that work in Europe. We hired them for this particular work and now have some men who can do this work efficiently.
>
> There is now and again a little interest in the use of rubblestone. It is due partly to the fact that the price of cement is much higher than it was when concrete began to displace rubblestone. With us the problem of getting out rubblestone is not as great as it was two years ago, when men were scarce and wages were high. If the demand for rubblestone comes we will be able to meet it.

Production of Stone in 1921

ABOUT 62,400,000 short tons of stone was quarried in the United States in 1921, according to the U. S. Geological Survey, Department of the Interior. This is more than 20 per cent less than the production in 1920. The estimated value of this stone is $92,500,000, a decrease of 30 per cent as compared with 1920.

Producers all over the country stated that both wages and prices had been reduced, and nearly all reported a decrease in the cost of production. High freight rates are said to have contributed largely to the general depression in the industry.

Building stone was in but little demand, and the returns at hand indicate a decreased output of about 25 per cent. The output of monumental stone, which has shown practically no diminution during the last five years, apparently decreased more than 45 per cent. Paving blocks were in great demand, and increases were shown in the sales of curbing and flagging, facts that indicate a revival in street work in cities and towns. The campaign begun for the betterment of suburban and country roads caused an increase of nearly 8 per cent in the output of crushed stone. Depression in the metal-smelting industry was reflected in a decrease of more than 50 per cent in stone sold for fluxing and for use as refractory material. Decreases were noted also in the demand for agricultural limestone, and for stone used by alkali works, sugar refineries, paper mills, and in other manufacturing establishments.

Atlas Co. Increases Wages

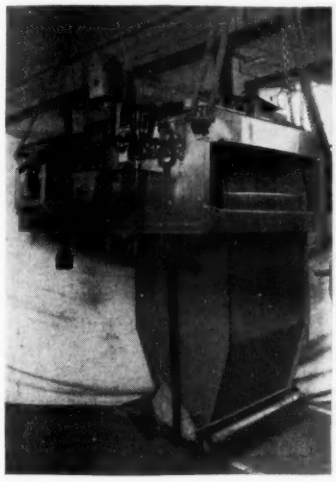
THERE has been an adjustment of wages at the plant of the Atlas Portland Cement Co., Hannibal, Mo., which will mean an increase for practically the entire force. The new schedule went into effect, on May 1. This wage increase speaks well for the company in view of the fact that wages generally have taken a downward turn.

New Machinery and Equipment

New Automatic Bulk Scale

A RECENT development for rock products producers in weighing crushed stone, sand, gypsum, cement clinker, shale, clay, coal, lime and other similar materials is the new Richardson automatic bulk scale manufactured by the Richardson Scale Co., Passaic, N. J.

For proportioning materials in cement manufacture, the company recommends the use of the automatic combined scales which consist of two scales yoked by an electrical gear, a lever system operated



A new scale for weighing crushed stone, sand, gypsum, cement, clinker, shales, clay, coal, lime, etc.

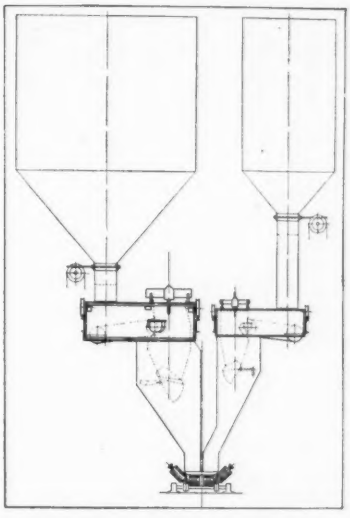
by solenoids so that neither scale can discharge without the other. Both dump simultaneously into a common hopper, from which the material is carried by conveyor or other means to other parts of the mill.

This type of scale weighs limestone rock and clinker ranging in size from 3 or 4-in. lumps down to dust; it also weighs crushed coal. The model J-55 scale will take care of pieces of shale or foreign matter up to 6 in., while a larger scale will handle pieces 8 and 10 in. or larger. This belt feed scale will handle any crushed material.

In cement manufacture there must be accuracy, therefore the materials are fed from their respective lines to the two automatic scales underneath. Each scale has an ample inlet chute, with a wide, short, slow-speed conveyor belt capable of conveying any material from the bin opening to the weighing hopper and there is no feed gate or mechanical cutoff to become jammed or blocked. When the predetermined weight of material has entered the weigh hopper the counterpoise end of the weigh beam rises, thus disengaging a jaw clutch on the driving mechanism. This stops the belt feed and no more material enters the hopper.

The hopper capacity in each case varies with the hourly tonnage of the material required for the mix, the scales being made to suit individual requirements. As the predetermined unit weight has entered the hopper the weigh beam balances, the feed stops, and the hopper contents is discharged into the common hopper below. The proportioning is by weight, not by measurement; it is accurate. The scales are fitted with a dust and rust-proof counter which records every discharge and then totals them.

Lime-plant operation demands the daily registering of fuel consumption and output in order to remedy

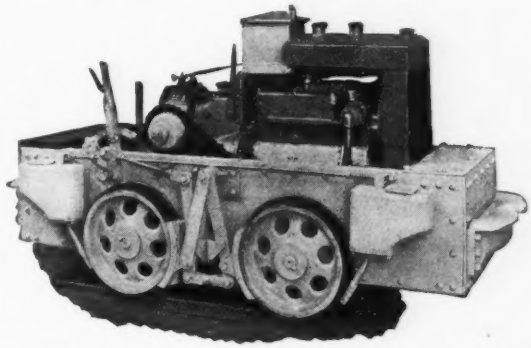


Richardson automatic combined scales for proportioning materials

reduced output or high fuel consumption. These measurements also furnish a guide to the relative value of the fuels used when changes are made. The Richardson scale, claim the makers, is thoroughly tested, ruggedly built for heavy, continuous service, and works well under gritty conditions.

This scale is also used for weighing crushed coal for the driers and weighs the coal from the overhead bunkers before it is delivered to the stokers of boilers. It will weigh wet, muddy, or frozen coal without choking and serves as a barometer for boiler, drier or kiln efficiency.

In proportioning materials for gypsum or sand-lime brick plants it is also suitable. The company also makes dust-proof bulk weighing scales for weighing finished cement or hydrated lime between grinder and stockrooms, and weighing and sacking scales for weighing cement, lime, gypsum, etc., from the bins to the sacks.



This locomotive, built for short haulage, is driven by an 18-hp. motor and has a capacity of 25 tons

Gasoline Locomotive for Light Hauling

A NEW gasoline and kerosene locomotive, shown in the illustration, has been placed on the market by the Atlas Car and Mfg. Co., Cleveland, Ohio, which is designed for both light haulage and heavy service. The rugged tractor-type motor has all its parts inclosed, but accessible. The intake air is washed by passing through a water clarifier.

The clutch is in the usual location just behind the flywheel and there is a bevel pin at the propeller-shaft end which is in constant mesh with two bevel gears, causing the latter to rotate in opposite directions. Forward or reverse motion is had by engaging either of these gears through a sliding-gear clutch. The drive from the bevel-gear shaft is by a spur-gear reduction to the jackshaft on the ends of which are mounted sprockets which drive the axles through roller chains. Speed changes are obtained by throttle controls in the steam locomotive.

The locomotive's drawbar pull is 800 lb. at 4.8 miles per hour, with a maximum speed of 8 miles. It is built for a track speed of 8 miles.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.25	1.10	1.10	1.10	.....
Buffalo, N. Y.	1.30 per net ton all sizes					
Burlington, Vt.	1.00	.....	2.50	2.00	2.00	.....
Chaumont, N. Y.	1.00	.....	1.75	1.50	1.50	1.50
Cobleskill, N. Y.	1.25	1.25	1.15	1.15	1.15	.....
Coldwater, N. Y.	1.50 per net ton all sizes; fluxing stone 1.80 per ton					
Eastern Penna.	1.10	1.35	1.35	1.35	1.35	1.35
Munns, N. Y.	1.00	1.25	1.25	1.25	1.25	1.25
Western New York	1.00	1.20	1.20	1.20	1.20	1.20
CENTRAL						
Alden, Ia.	.80@1.00	.80@1.00	1.50	1.45	.....	.....
Alton, Ill.	2.00	.....	1.50	1.35	1.35	.....
Buffalo, Iowa	1.00	.....	1.15	.95	1.00	1.00
Chicago, Ill.	1.20	1.60	1.20	1.20	1.20	1.20
Dundas, Ont.	1.00	1.35	1.35	1.25	1.10	1.10
Faribault, Minn.	.....	.....	.....	.....	1.75	.....
Greencastle, Ind.	1.25	1.00	1.00	.90	.90	.90
Illinois, Southern	1.75	1.60	1.50	1.50	1.40	.....
Kansas City, Mo.	.60	1.60	1.60	1.60	1.60	1.60
Kokomo, Ind.	1.10	1.25	1.25	1.10	1.10	1.10
Krause or Columbia, Ill.	1.35	1.20	1.20	1.10	1.10	1.10
Lannon, Wis.	.80	.....	.90	.....	.80	.80
Marblehead and Brillion, Wis.	1.10	.....	1.20	1.10	1.10	.....
Montreal, Canada	.85	1.20	1.10	1.05	1.00	.....
Montrose, Ia.	.....	1.50	1.60	1.55	1.50	.....
River Rouge, Mich.	1.00	1.10	1.10	1.10	1.10	1.00
Sheboygan, Wis.	1.00	1.10	1.10	1.10	1.00	.....
Southern Illinois	1.35	1.20	1.20	1.20	1.20	.....
Stolle, Ill. (I. C. R. R.)	1.30	.....	1.25	1.35	.....	.....
Stone City, Iowa	.75	.....	1.40	1.30	1.25	.....
Toledo, Ohio	1.60	1.70	1.70	1.70	1.60	1.60
Toronto, Canada	1.90	2.25	2.25	2.25	2.00	2.00
	Prices include 90c freight					
Valmeyer, Ill.	1.60	1.30	1.30	1.30	1.30	1.30
Waukesha, Wis.	all sizes 1.10 per ton					
SOUTHERN:						
Alderson, W. Va.	1.10	1.35	1.65	1.35	1.35	.....
Bromide, Okla.	1.50	.....	.....	1.50	1.50	.....
Cartersville, Ga.	.....	2.00	2.00	1.40	1.40	1.40
Chickamauga, Tenn.	.90	1.00	1.00	1.00	.90	.....
Dallas, Texas	1.00	1.00	1.00	1.00	1.00	1.00
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	.....
Gainesville, Ga.	1.00	1.25	1.25	1.25	1.25	1.25
Garnet and Tulsa, Okla.	.50	1.60	1.60	1.45	1.45	.....
Ladds, Ga.	2.00	2.00	2.00	1.50	1.50	1.50
Morris Spur (near Dallas) Tex.	1.00	1.25	1.25	1.25	1.25	1.00
Portland, Ga.	.60@1.00		(All other sizes 1.00@1.25)			
Shephard, Tenn.	1.00	.75@1.00	.75@1.00	.75@1.00	.75@1.00	.....
WESTERN:						
Atchison, Kans.	.50	1.80	1.80	1.80	1.80	1.80
Blue Springs and Wymore, Neb.	.20	1.65	1.65	1.55	1.45	1.40
Cape Girardeau, Mo.	1.50	.....	1.50	1.50	1.25	.....
Kansas City, Mo.	1.00	1.50	1.50	1.50	1.50	1.40

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Bernardsville, N. J.	2.00	2 20	2.00	1.80	1.50	.....
Branford, Conn.	.60	1.50	1.25	1.15	1.00	.....
Bound Brook, N. J.	1.80	2.30	1.90	1.50	1.40	.....
Dresser Jct., Wis.	1.25	2.25	2.25	2.00	1.50	1.50
Duluth, Minn.	.90@1.00	2.25	1.90@2.00	1.40@1.50	1.30@1.40	1.25@1.30
E. Summit, N. J.	2.10	2.30	2.00	1.70	1.40	.....
Eastern Mass.	.60	1.85	1.60	1.50	1.50	1.50
Eastern New York	.75	1.60	1.60	1.40	1.40	1.40
Eastern Penna.	1.25	1.65	1.50	1.40	1.30	1.30
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60	1.50	1.25	1.15	1.00	.....
Oakland, Calif.	1.75	1.75	1.75	1.75	1.75	1.75
Richmond, Calif.	.50*	.....	1.75*	1.50*	1.50*	.....
San Diego, Calif.	.50@ .70	1.45@1.75	1.40@1.70	1.30@1.60	1.25@1.55	1.25@1.55
Springfield, N. J.	2.00	2.10	1.80	1.60	1.50	.....
Westfield, Mass.	.60	1.35	1.25	1.10	1.00	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Alexandria Bay, N. Y.	1.60	.....	1.30	1.50	1.20	.....
Dell Rapids, S. D.—Granite	.75	1.85	1.75	1.70	1.70	.....
Dundas, Ont.—Flint	1.00	1.50	1.50	1.50	1.25	1.20
Eastern Penna.—Sandstone	.85	1.60	1.50	1.35	1.35	1.35
Eastern Penna.—Quartzite	.90	1.35	1.20	1.20	1.30	1.30
Ft. Springs, W. Va.—Granite	1.00	1.25	1.40	1.25	1.20	.....
Holton, Ga.—Granite	.40	.....	2.50	2.25	2.25	2.00
Lohrville, Wis.—Cr. Granite	1.35	1.40	1.30	.....	1.20	.....
Los Angeles, Cal.—Granite	.....	1.25@1.50	1.15@1.40	1.15@1.40	.....	.....
Macon, Ga.—Granite	.50	.....	2.50	2.25	2.00	1.25@1.90
Middlebrook, Mo.—Granite	3.00@3.75	.....	2.00@2.40	2.00@2.65	.....	1.50@1.85
Red Granite, Wis.	1.35	1.40	1.30	1.50	1.20	.....
Sioux Falls, S. D.—Granite	.75	1.85	1.75	1.70	1.70	.....
Utley, Wis.—Red Granite	1.35	1.40	1.30	.....	1.20	.....

*Cubic yard. †Agrl. lime. ‖R. R. ballast. §Flux. ‡Rip-rap. a 3-inch and less.

Agricultural Limestone

EASTERN:

Chaumont, N. Y. — Analysis, 95% $CaCO_3$, 1.14% $MgCO_3$ — Thru 100 mesh; sacks, 4.00; bulk 2.50

Grove City, Pa. — Analysis, 94.89% $CaCO_3$, 1.50% $MgCO_3$—100% thru 20 mesh, 60% thru 100 mesh, 40% thru 200 mesh; in 80 lb. paper sacks, 4.50; bulk 3.00

Hillsville, Pa. — Analysis, 96.25% $CaCO_3$—75% thru 100 mesh; 85% thru 50 mesh; sacks, 4.50; bulk 3.00

Jamesville, N. Y. — Analysis, 89.25% $CaCO_3$, 5.25% $MgCO_3$; sacks, 4.00; bulk 2.50

New Castle, Pa.—89% $CaCO_3$, 1.4% $MgCO_3$—75% thru 100 mesh, 84% thru 50 mesh, 100% thru 10 mesh; sacks, 4.75; bulk 3.00

Osborne, Pa.—45% thru 200 mesh, 60% 100 mesh, 100% thru 20 mesh; 4.50 sacks; bulk 3.00

Texas, Md.—Analysis, 58.02% $CaCO_3$, 37.3% $MgCO_3$—50% thru 50 mesh; bags, 4.25; bulk 2.50

West Stockbridge, Mass., Danbury, Conn., North Pownal, Vt.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 5.00—cloth, 5.25; bulk.. 3.50

Williamsport, Pa. — Analysis, 90% $CaCO_3$, 2% $MgCO_3$—50% thru 50 mesh; paper, 4.75; bulk 3.75

CENTRAL:

Alton, Ill. — Analysis, 98% $CaCO_3$, 0.3% $MgCO_3$—90% thru 100 mesh.... 4.00

Bedford, Ind. — Analysis, 98.5% $CaCO_3$, .5% $MgCO_3$—90% thru 10 mesh 1.50

Belleville, Ont. — Analysis, 90.9% $CaCO_3$, 1.15% $MgCO_3$—45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk 2.50

Bellevue, Ohio — Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; ¼ in. to dust, about 20% thru 100 mesh..... 1.25

Bettendorf, Ia., and Moline, Ill.—97% $CaCO_3$, 1.5% $MgCO_3$—50% thru 100 mesh; 50% thru 4 mesh..... 1.50

Buffalo, Ia.—90% thru 4 mesh..... 1.00

Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.3% $MgCO_3$ (90% thru 50 mesh, 2.00), 50% thru 4 mesh..... 1.50

Chicago, Ill.—Analysis, 53.63% $CaCO_3$, 37.51% $MgCO_3$—90% thru 4 mesh.... 1 00

Columbia, Ill., near East St. Louis—½-in. down ..... 1.25@1.80

Detroit, Mich.—Analysis, 88% $CaCO_3$, 7% $MgCO_3$—75% thru 200 mesh, 2.50@4.75—60% thru 100 mesh..... 1.80@3.80

Elmhurst, Ill. — Analysis, 35.73% $CaCO_3$,, 20.69% $MgCO_3$—50% thru 50 mesh 1.25

Greencastle, Ind. — Analysis, 98% $CaCO_3$—50% thru 50 mesh..... 2 00

Kansas City, Mo.—50% thru 100 mesh 1.50

Krause and Columbia, Ill.—Analysis, 90% $CaCO_3$, 90% thru 4 mesh..... 1.35

Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$—90% thru 50 mesh..... 2.00

Marblehead, Ohio — Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$—50% thru 52 mesh, 50% thru 59 mesh, 100% thru 10 mesh; bags, 4.50; bulk..... 3.00

Milltown, Ind. — Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$—40.8% thru 100 mesh, 61.2% thru 50 mesh..... 1.40@1.50

Mitchell, Ind. — Analysis, 97.65% $CaCO_3$, 1.76% $MgCO_3$ — 60% thru 100 mesh, all thru 10 mesh..... 1.25

Montrose, Ia.—50% thru 100 mesh..... 1.35

Narlo, Ohio—Analysis 56% $CaCO_3$, 43% $MgCO_3$, limestone screenings, 37% thru 100 mesh; 55% thru 50 mesh; 100% thru 4 mesh..... 1.50@2.00

Ohio (different points), 20% thru 100 mesh; bulk ..... 1.25@1.50

Piqua, O.—100% thru 10; 80% thru 50; 70% thru 100..... 3.25@5.00

99% thru 10; 55% thru 50; 40% thru 100 ..... 1.75@2.00

River Rouge, Mich. — Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk..... .80@1.40

Stolle, Ill., near East St. Louis on I. C. R. R.—Thru ½-in. mesh..... 1.30

Stone City, Ia.—Analysis, 98% $CaCO_3$ 50% thru 30 mesh..... .75

(Continued on next page)

Agricultural Limestone

(Continued from preceding page.)

Toledo, Ohio—¼-in. to dust, 20% thru 100 mesh 1.50
Waukesha, Wis.—No. 1 kiln dried..... 2.00
No. 2 Natural..... 1.75
Whitehill, Ill. — Analysis, 96.12% $CaCO_3$, 2.5% $MgCO_3$—90% thru 100 mesh 5.00
90% thru 50 mesh..... 1.35
Yellow Springs, Ohio—Aanlysis 96.08% $CaCO_3$, 63% $MgCO_3$, 32% thru 100 mesh; 95.57%, sacked, 6.00; bulk.... 4.25

SOUTHERN:

Alderson, W. Va.—90% thru 50 mesh 1.50
Barber, Va.—Analysis, 92 to 98% $CaCO_3$—Bags, 6.50; bulk..... 4.50
Blowers, Fla.—Analysis, 98% combined carbonates—75% thru 200 mesh..... 4.75
Cape Girardeau, Mo. — Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$ — 50% thru 100 mesh 2.00
90% thru 4 mesh..... 1.50
Cartersville, Ga.—Analysis, all thru 10 mesh ..... 1.75@2.00
Claremont, Va.—Analysis, 92% $CaCO_3$, 2% $MgCO_3$—90% thru 100 mesh, 4.00; 50% thru 100 mesh, 3.00; 90% thru 50 mesh, 3.00; 50% thru 50 mesh, 2.75; 90% thru 4 mesh, 2.75; 50% thru 4 mesh..... 2.75
Ft. Springs, W. Va. — 50% thru 100 mesh 3.00
Hot Springs, N. C.—90% thru 100 mesh, sacks, 4.25; bulk..... 3.00
Knoxville, Tenn.—Pulverized 2.50
90% thru 100 mesh..... 2.00
90% thru 50 mesh..... 1.50
Ladds, Ga.—90% thru 50 mesh..... 2.00
Linnville Falls, N. C.—Analysis,, 53% $CaCO_3$; 42% $MgCO_3$—50% thru 100 mesh: sacks, 4.50; bulk..... 3.00
Mountville, Va. — Analysis, 76.60% $CaCO_3$, 22.83% $MgCO_3$—X thru 20 mesh; sacks 5.00

WESTERN:

Colton, Calif.—Analysis, 95% $CaCO_3$, 2-4% $MgCO_3$—all thru 14 mesh—bulk 4.00
Garnett, Okla.—Analysis, 86% $CaCO_3$, 50% thru 4 mesh ..... .50
Kansas City, Mo., Corrigan Sid'g—50% thru 100 mesh; bulk..... 1.80
Terminous, Calif. — Analysis, 97.3% $CaCO_3$, .04% $MgCO_3$—65% thru 200 mesh, 90% thru 100 mesh, 95% thru 80 mesh, 100% thru 50 mesh; sacks, 5.00; bulk 4.50
Tulsa, Okla.—90% thru 4 mesh..... .50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

GLASS SAND:

Baltimore, Md. 2.25
Berkley Springs, W. Va..... 1.75@2.00
Cedarville and South Vineland, N. J.—Damp, 1.75; dry..... 2.25
Cheshire, Mass. ..... 5.00@8.00
Columbus, Ohio—Glass sand..... 1.25
Dunbar, Pa.—Damp 2.00
Hancock, Md.—Damp ..... 2.50@3.50
Klondike and Pacific, Mo..... 1.75@2.50
Mapleton, Pa. ..... 2.25@2.50
Massillon, Ohio 3.00
Millington, Ill. 1.75
Mineral Ridge, O..... 2.50
Green 2.25
Montoursville, Pa. 1.75
Oregon, Ill.—Glass sand..... .75
Pittsburgh, Pa.—Dry, 4.00; damp..... 3.00
Rockwood, Mich. 2.75
Round Top, Md.—Dry..... 1.25
St. Mary's Pa.—Unwashed..... 2.00
Thayers, Pa. 2.00
Utica, Ill. ..... 1.00@1.25
Zanesville, Ohio ..... 2.00@2.50

FOUNDRY SAND:

Albany, N. Y.—Sand blast..... 4.00
Molding fine and brass molding..... 2.00
Molding coarse 1.75
Allentown, Pa.—Core and molding fine 1.50@1.75
Arenzville, Ill.—Molding fine..... 1.40
Beach City, O. — Core, washed and screened ..... 2.00@2.50
Furnace lining ..... 2.50@3.00
Molding fine and coarse..... 2.25@2.50
Cleveland, O.—Molding coarse..... 1.50@2.00
Brass molding ..... 1.50@2.00
Molding fine ..... 1.50@2.25
Core ..... 1.25@1.50
Columbus, O.—Core ..... .30@1.75
Sand blast ..... 3.50@5.00
Furnace Lining 1.50
Molding fine 2.00
Molding coarse 1.75

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Attica, N. Y.	.75	.75	.75	.60	.60	.60
Ambridge and So. Heights, Pa.		1.15	1.15	1.15	.70	.70
Buffalo, N. Y.	1.10	.95	.85	.85	.85	.85
Erie, Pa.	1.00		1.00		1.25	
Farmingdale, N. J.	.48	.48	1.50	1.30	1.20	1.20
Hartford, Conn	.90		1.25	1.15	1.15	1.15
Leeds Junction, Me.		.50	1.75	1.35	1.35	1.25
Ludlow, Mass.	.75•	.75•	1.70		1.50•	1.50•
Philadelphia, Pa.	.75	.75		1.40	1.25	
Pittsburgh, Pa.	1.15	1.15	1.15	1.15	.70	.70
Portland, Maine		.50	1.75		1.35	1.35
Texas, Md.		1.00		Pure white sand, 1.50		
Washington, D. C.	.75	.75	1.60	1.40	1.20	1.20
CENTRAL:						
Alton, Ill.		.85				
Anson, Wis.	.40	.40				.90
Attica and Covington, Ind.	.90	.90	.90	1.00	1.00	1.00
Barton, Wis.		.60	.70	.70	.70	.70
Beloit, Wis.		.50			.50	
Chicago, Ill.		1.75@2.23	1.75@2.43			
Cincinnati, Ohio	.70	.65	.90	.90	.90	.90
Columbus, Ohio	.75	.75@1.00	.75@1.00	.75@1.00	.75@1.00	.75@1.00
Des Moines, Ia.	.50	.40	1.50	1.50	1.50	1.50
Detroit, Mich.	.65	.65	.95	.95	.95	.95
Farlestead (Flint), Mich.	.70		60-40 sieves, .85; Pebbles, .95			
Eau Claire, Wis.	.40		1.25		.90	
Elkhart Lake, Wis.	.70	.58	.90	.90	.72	.72
Ft. Dodge, Ia.		1.22		2.17		
Grand Rapids, Mich.		.50		.80		.70
Greenville, Mechanicsburg, O.	.65	.65	.65	.65	.65	.65
Hamilton, Ohio		.90			.90	
Hawarden, Ia.		.50			1.60	
Hersey, Mich.		.50			.80	
Indianapolis, Ind.	.60	.60		1.50	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Le Mars, and Doon, Ia.		.90		1.80		
Libertyville, Ill.		.50		.70		
Mankato, Minn.	.40	.40	.75@1.25	.75@1.25	.75@1.25	.75@1.25
Mason City, Ia.	.65	.55	1.70	1.60	1.60	1.55
Milwaukee, Wis.	1.06	1.06	1.26	1.26	1.26	
Minneapolis, Minn.	.35	.35	1.35	1.25	1.25	1.25
Moline, Ill.	.60	.60	1.20	1.20	1.20	1.20
Riton, Wis.		.40			.60	
St. Louis, Mo., f. o. b. cars	1.10	1.30	1.50	1.30		1.25
St. Louis, Mo., delivered on job	2.05	2.20	2.35	2.15		2.10
Summit Grove, Clinton, Ind.	.65	.65	.65	.75	.75	.75
Terre Haute, Ind.	.60@ .75	.60@ .75	.75	.75	.75	.75
Waukesha, Wis.	.60		All other sizes, .70 per ton			
Winona, Minn.	.40@ .50	.40	.80@1.00	.80@1.00	.80@1.00	.80@1.00
Yorkville and Moronts, Ill.	.80	.60@ .80	.60@ .80	.60@ .80	.60@ .70	.60
SOUTHERN:						
Alexandria, La.		.70			1.20@1.35	
Birmingham, Ala.	1.48		all gravel—1.88			
Charleston, W. Va.		1.45	1.50	1.50	1.50	1.50
Estelle Springs, Tenn.	1.15	1.00	1.00	1.00	.85	.65
Ft. Worth, Tex.		2.00		2.00		2.00
Jackson's Lake, Ala.	.50@ .60	.50@ .60	.40@1.00	1.00	.50@1.00	.50@1.00
Knoxville, Tenn.	1.00	1.00	1.75	1.75	1.75	1.75
Lake Weir, Fla.		.60				
Macon, Ga.		.50@ .75				
Memphis, Tenn.	1.12	1.12				1.95
N. Martinsville, W. Va.		1.00		1.20		.80
New Orleans, La.		.50			1.00	
Pine Bluff, Ark.	1.20	.90	Washed gravel, all sizes, 2.25			
Roseland, La.		.25@ .50	1.00@1.50	.85@1.00	.85@1.00	
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Jedburg, Mo.	.70	1.20	.95	.75	.75	.70
Kansas City, Mo.	(Kaw River sand, car lots, .75 per ton, Missouri River, .85)					
Los Angeles, Calif.		.75	1.25	1.25	1.15	1.15
Niles, Calif.	1.00	1.00	1.40	1.00	1.00	1.00
Pueblo, Colo.	1.10•	.90•		1.25•		1.50•
San Diego, Calif.	.80@1.00	.80@1.00	1.30@1.60	1.25@1.55	1.15@1.45	1.10@1.40
San Francisco, Calif.		1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Seattle, Wash.	1.50•	1.50•	2.00•	1.50•		1.50•
Yutan, Neb.	.40		Bank run .40			

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel 2 inch and less
Attica, Covington, Silverwood, Ind., and Palestine, Ill.	.75	.75	.75	.75	.75	.75
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Cape Girardeau, Mo.			River sand, 1.00 per yd.			
Cherokee, Ia.			80 per ton—1.20 washed			
Dudley, Ky. (Crushed Sand)		1.00		.95		
East Hartford, Conn.			.65 per cu. yd.			
Elkhart Lake, Wis.			Washed gravel .66			
Estelle Springs, Tenn.						.85
Fishers, N. Y.	.50@ .65			.50@ .65		.50
Hamilton, O.			.40 per cu. yd. in pit			
Hartford, Conn.		1.00•				
Hersey, Mich.				.50		
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Tex.		.95				.55
Janesville, Wis.		.65			.65@ .75	
Oxford, Mich.				.65	.65	
Pine Bluff, Ark.			Road gravel .50			
Rochester, N. Y.	.60@ .75	.60@ .75			.50@ .65	.50@ .65
Roseland, La.		.75				
Saginaw, Mich., f. o. b. cars		.75	1.30	1.30	1.30	1.30
St. Louis, Mo.		60% gravel, 40% sand, 1.40				
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waco, Texas		.80		1.50		1.30
Winona, Minn.			Clean pit run .50@.60			
York, Pa.		.90@1.10	(crushed rock sand)			

•Cubic yard. B Bank. L Lake. ‖ Ballast.

Crushed Slag

City or shipping point	Roofing	¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Buffalo, N. Y.	1.25	1.25	1.25	1.25	1.25	1.25	1.25
E. Canaan, Conn.	4.00	1.00	2.50	1.25	1.15	1.10	1.10
Eastern Pennsylvania and Northern New Jersey	2.00	1.20	1.50	1.20	1.20	1.20	1.20
Easton, Pa.	2.00	.80	1.25	.90	.90	.80	.80
Erie, Pa.	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Emporium, Pa.	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Sharpsville and West Middlesex, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Pennsylvania	2.00	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.	All sizes, $1.50, F. O. B. Chicago						
Detroit, Mich.	All sizes, 1.65, F. O. B. Detroit						
Ironton, O.	2.05	Other grades 1.45					
Stuebenville, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	1.92	1.67	1.77	1.77	1.77	1.67	1.67
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	(Any delivery in city except team track deliveries) 1.25	1.50	1.25	1.25	1.25	1.25
Steubenville, Lowellville and Canton, O.	2.00	1.35	1.60	1.35	1.35	1.35	1.35
SOUTHERN:							
Birmingham, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Ensley, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Longdale, Goshen, Glen Wilton & Low Moor, Roanoke, Va.	2.50	1.00	1.00	1.25	1.25	1.15	1.05

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing Hydrate	Masons' Hydrate	Agricultural Hydrate	Chemical Hydrate	Ground Burnt Lime Blk.	Ground Burnt Lime Bags	Lump Lime Blk.	Lump Lime Bbl.
EASTERN:								
Adams, Mass.			7.00					3.50
Bellefonte, Pa.			8.00	9.00	8.00		7.00	
Berkley, R. I.			12.00					2.30
Buffalo, N. Y.		11.00	11.00	11.00			9.50	2.00•
Chaumont, N. Y.					2.50	4.00		
Lime Ridge, Pa.							5.00	
Paxtang and LeMoyne, Pa.					5.00		4.75@5.00	
Union Bridge, Md.			13.00		5.50			
West Rutland, Vt.	13.50@14.00	11.00@11.50	11.00@11.50	13.50	10.00		11.00	3.50
West Stockbridge, Mass.			15.00					
Williams and Blue Bell, Pa.			11.25					
Williamsport, Pa.			10.00			10.00	6.00	
York, Pa. (dealers' prices)		10.50	10.50	12.50			8.00	
CENTRAL:								
Delaware, Ohio	10.50	9.00	8.00	10.00			8.00	1.50
Geneo, Ohio	10.50§							
Gibsonburg, Ohio	10.50§	9.00	8.50		7.25	9.25	8.00	
Huntington, Ind.	10.50	9.00	8.50				8.00	1.70•
Knowles and Valders, Wis.			12.50		5.00	9.00		
Luckey, Ohio	10.50	9.00	8.00				8.00	
Marblehead, Ohio		9.00	8.50				8.00	1.50•
Mitchell, Ind.		11.00	11.00	11.00	9.50		8.50	
Sheboygan, Wis.					5.50	8.50		
White Rock, Ohio	10.50				7.25	9.25		
Woodville, O. (dlrs.' price)	10.50a	9.00a	8.00a	10.00a	7.25		8.00	1.50
SOUTHERN:								
El Paso, Tex.							12.50	
Karo, Va.							7.00	1.30
Knoxville, Tenn.		9.50@11.00	9.50				7.50	1.30
Ocala and Zuber, Fla.	12.00						10.00	1.50
Sherwood, Tenn	11.00	9.50			7.50		7.50	
Staunton, Va.					8.00		9.50b	1.60
WESTERN:								
Colton, Calif.			15.00				19.70	
Kirtland, N. Mex.					12.50	15.00		
San Francisco, Calif.	22.00	22.00	15.00	22.00				2.15•
Tehachapi, Calif.							13.00	2.00

‡100-lb. sacks; •180-lb. net, price per barrel; †180-lb. net, non-returnable metal barrel; §Paper sacks. (a) 50-lb. paper bags; terms, 30 days net; 25c per ton or 5c per bbl. discount for cash in 10 days from date of invoice. (b) Burlap bags. (c) 200-lb. bbl.

Miscellaneous Sands

(Continued from preceding page)

Stone sawing	1.25
Traction	.75
Brass molding	2.00
Delaware, N. J.—Molding fine	2.00
Molding coarse	1.90
Brass Molding	2.15
Dresden, O.—Molding coarse	1.50@1.75
Brass molding	1.75
Dunbar, Pa.—Traction, damp	2.00
Dundee, O.—Glass, core, sand blast, traction	2.50
Molding fine, brass molding (plus 75c for winter loading)	2.00
Molding coarse (plus 75c for winter loading)	1.75
Falls Creek, Pa.—Glass sand	2.50
Furnace lining, traction and molding coarse and fine, and core	2.00
Sand blast	3.50
Eau Claire, Wis.—Core	.75@1.25
Sand blast	3.25@4.25
Traction sand	.50
Franklin, Pa.—Core	1.00@1.75
Furnace lining	2.25
Molding fine	2.00
Molding coarse	1.75
Brass molding	2.00
Greenville, Ill.—Molding coarse	1.20@1.40
Joliet, Ill.—Milled, dried and screened No. 2 coarse molding sand and open hearth loam and looting clay	.75@1.25
Kansas City, Mo.—Missouri River core	.80
Kasota, Minn.—Molding coarse and fine, stone sawing (pit run)	1.75
Klondike, Pacific and Gray Summit, Mo.—Molding fine and core	1.75@2.00
Mapleton, Pa.—Glass sand, core, furnace lining, molding fine and coarse; dry, 2.50; damp	2.00
Massillon, O.—Traction, molding fine and coarse, furnace lining, core	2.25
Michigan City, Ind.—Core, traction	.30@ .40
Mineral Ridge, Ohio—Core, furnace lining, molding fine and coarse, roofing, sand blast, stone sawing and traction, brass molding	2.00
Montoursville, Pa.—Core	1.25@1.50
Traction	1.00@1.25
Brass molding	1.25@1.40
New Lexington, O.—Molding fine	2.00
Molding coarse	1.75
Oregon, Ill.—Core, furnace lining, molding fine and coarse, traction	.75
Brass molding	.75
Sand blast	3.00
Ottawa, Ill.—Core, molding coarse (crude silica sand)	.60@ .75
Furnace lining	.70@ .85
Ottawa, Minn.—Core	1.00@1.50
Glass, molding coarse, stone sawing (all crude silica)	1.00@1.50
Pelzer, S. C.—Glass sand (carload lots only)	.70

Miscellaneous Sands

(Continued)

Rockwood, Mich.—Core, damp	2.50
Roofing	2.75
Sand blast	3.75
Round Top, Md.—Glass sand	1.75@2.00
Core, furnace lining	1.45
Traction	1.60
(All per 2000 lbs.)	
San Francisco, Cal.—Glass and roofing	3.00@3.50
Core, molding fine and brass	2.30@2.60
Furnace lining and molding coarse	3.60@4.25
Coarse core sand	3.60@4.25
Sand blast	3.75
Stone sawing and traction	2.30
Thayers, Pa.—Core	1.50@1.75
Furnace lining	1.00
Molding fine and coarse	1.25
Traction	1.75
Utica, Ill.—Core	.75@1.00
Furnace lining	1.00
Molding fine and coarse	.60
Sand blast	2.50
Stone sawing	1.00
Traction and brass molding	1.00@1.25
Utica, Pa.—Core	1.25@2.25
Molding fine and coarse, traction, brass molding	2.00
Warwick, O.—Core, furnace lining, molding fine and coarse (damp, 1.75) dry	2.00
Traction (dry)	2.00
Zanesville, Ohio—Brass molding and molding fine	1.50@1.75
Molding coarse	1.25@1.50

Talc

Prices given are per ton f. o. b. (in carload lots only) producing plant, or nearest shipping point.

Baltimore, Md.—Crude Talc	3.50
Ground talc (20-50 mesh), bags	10.00
Cubes	50.00
Blanks, per lb.	.07
Chatsworth, Ga.—Crude talc	8.00@10.00
Ground talc (150-200 mesh), bags	12.50
Pencils and steel workers' crayons, per gross	1.50@ 2.00
Chester, Vt.—Ground talc (150-200 mesh), including bags	8.25@10.00
Emeryville, N. Y.—150-200 mesh; bags	14.75
Glendale, Calif.—Ground talc (150-200-mesh	16.00@30.00
(Bags extra)	
Ground Talc (50-300 mesh)	13.50@15.50
200 mesh)	13.50@14.50
Hailesboro, N. Y.—Ground talc (150-250 mesh), bags	18.00
Henry, Va.—Crude talc (lump mine run), per 2000-lb. ton	2.75@3.50
Ground talc (20-50 mesh)	5.75
(150-200 mesh) bags	8.75@11.50
Johnson, Vt.—Ground talc (20-50 mesh), bulk 7.50 (150-200 mesh)	8.00@15.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@15.00
(Bags extra)	
Los Angeles, Calif.—Ground talc (200 Mesh)	20.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags	12.00@13.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@10.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@22.00
(Bags extra)	
Vermont—Ground talc (20-50 mesh); bags	7.50@10.00
Ground talc (150-200 mesh); bags	9.00@16.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk	8.50
(Bags $1.00 extra)	
Ground talc (150-200 mesh), bulk	10.00@15.00
(Bags 1.00 extra)	
Pencils and steel workers' crayons, per gross	1.20@ 2.00

Rock Phosphate

Raw Rock

Per 2240-lb. Ton	
Centerville, Tenn—B.P.L. 72% to 75%	6.00@8.50
B.P.L. 65%	6.00
Gordonsburg, Tenn.—B.P.L. 68%@72%	4.00@5.00
Tennessee—F. o. b. mines, long tons, unground Tenn. brown rock, 72% B. P. L.	7.00
Mt. Pleasant, Tenn.—Analysis, .70 B.P.L. (2000 lbs.)	7.00
Montpelier, Idaho—70% B.P.L.—Crude	4.75
Crushed 2-in. ring and dried	5.00
Paris, Idaho.—2,000 lb. mine run, B.P.L. 70%	4.00
Wales, Tenn.—B.P.L. 70%	7.50
Per 2000-lb. Ton	
Barton, Fla.—Analysis, 50% to 65% B.P.L.	4.00@6.00

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f.o.b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$ 9.30	$8.40	$8.10	$7.80
24x14	9.30	8.40	8.10	7.80
22x12	10.80	8.70	8.40	9.10
22x11	10.80	8.70	8.40	9.10
20x12	10.80	8.70	8.40	9.10
20x10	11.70	9.00	8.70	8.40
18x10	11.70	9.00	8.70	8.40
18x 9	11.70	9.00	8.70	8.40
16x10	11.70	8.40	8.40	8.10
16x 9	11.70	8.40	8.40	8.10
16x 8	11.70	8.40	8.40	8.10
18x12	11.10	8.70	8.40	8.10
16x12	11.10	8.70	8.40	8.10
14x10	11.10	8.40	8.10	7.80
14x 8	11.10	8.40	8.10	7.80
14x7 to 12x6	9.60	8.40	8.10	.....
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$7.50	$7.20	$5.75
22x11	8.40	7.80	7.50	5.75
Other sizes	8.70	8.10	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.
Granulated slate per net ton f. o. b. quarries, Vermont and New York, 7.50

(Continued from preceding page)

Ground Rock

Centerville, Tenn.—B.P.L. 65%	6.00
B.P.L. 75% (brown rock)	12.00
Columbia, Tenn.—B.P.L. 68% to 72%	5.50
B.P.L. 65% (90% thru 200 mesh) bulk	5.50
Morriston, Fla.—Analysis, 35% B.P.L.	12.00
Mt. Pleasant, Tenn.—B.P.L. 65 to 70%	5.00@6.50

Florida Soft Phosphate

Raw Land Pebble

Per Ton	
Bartow and Norwills, Fla.—B.P.L. 50%, bulk	6.00@ 8.00
B.P.L. 78%, bulk	13.50
Florida—F. o. b. mines, long ton, 68/66% B.P.L.	3.00
68% (min.)	3.25
70% (min.)	3.50
Jacksonville (Fla.) District	10.00@12.00

Ground Land Pebble

Per Ton	
Jacksonville (Fla.) District	14.00
Add 2.50 for sacks.	
Lakeland, Fla.—B.P.L. 60%	6.00
Morristown, Fla.—26% phos. acid	16.00
Mt. Pleasant, Tenn.—65-70% B.P.L.	6.00@ 7.00

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Chicago, Ill.—Stucco chips, in sacks f.o.b quarries		17.50
Deerfield, Md. — Green; bulk	7.00	7.00
Easton, Pa.—Evergreen, creme green and royal green marble	20.00	9.00@14.00
Granville, N. Y. — Red slate granules		7.50
Ingomar, Ohio	12.00@25.00	12.00@25.00
Lincoln, Neb. — Red, white, grey, in bags		30.00
Middlebrook, Mo.—Red granite; sacks	30.00@32.50	20.00@25.00
Milwaukee, Wis.		20.00@26.50
Phillipsb'g, N. J.—Green stucco dash		9.00@14.00
Piqua, O.—Marble	8.00@10.00	7.00@ 9.00
Poultney, Vt. — Roofing granules		3.75
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Tuckahoe, N. Y.	7.00@12.00	12.00
Wausau, Wis.	14.00@18.00	

Concrete Brick

Prices given per 1,000 brick, f. o. b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	20.00	25.00@32.00
Bellows Falls, Vt.	18.00	25.00
Birmingham, Ala.	18.00	32.00@49.00
Bridgeport, Conn.	31.00	32.00
Carpenterville, N. J.	16.00	35.00@65.00
Easton, Pa.	16.00	40.00@60.00
Eugene, Ore.	25.00	50.00
Rochester, N. Y.	21.00	
Friesland, Wis.	20.00	
Houston, Tex.		19.50
Lockport, N. Y.	16.00	
Omaha, Neb.	20.00	30.00@40.00
Piqua, O.	15.00	25.00
Phoenix, Ariz.	16.00	35.00@80.00
Portland, Ore.	21.00	45.00@75.00
Puyallup, Wash.	20.00	35.00@85.00
Rapid City, S. D.	18.00	25.00@40.00
St. Paul, Minn.	15.00	30.00@35.00
Salem, Ore.	25.00@30.00	35.00@75.00
Salt Lake City, Utah	18.00	35.00
Seattle, Wash.	18.00@22.00	35.00@75.00
Springfield, Ill.	18.00	20.00@25.00
Tampa, Fla.	15.00	25.00@65.00
Wauwatosa, Wis.	13.00@13.50	26.00@42.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	7.00
Barton, Wis.	8.50
Boston, Mass.	12.00@13.00
Brighton, N. Y.	14.75
Buffalo, N. Y.	16.50
Dayton, Ohio	13.50
El Paso, Texas	12.00
Gary, Ind.	11.50@12.00
Grand Rapids, Mich.	12.00
Lancaster, N. Y.	12.75
Michigan City, Ind.	10.00
Milwaukee, Wis.	12.00@12.50
Minneapolis, Minn.	13.00
Plant City, Fla.	10.00
Portage, Wis.	15.00
Redfield, Mass.	15.00
Rives Junction, Mich.	10.00
Saginaw, Mich.	11.50
San Antonio, Texas—Common	15.00
South Dayton, Ohio	12.50@13.50
Syracuse, N. Y. (delivered at job)	18.00
F. o. b. cars	13.00
Washington, D. C.	13.50
Winnipeg, Can.	14.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton Finishing	Common
Atlanta, Ga.	19.00	16.00
Baltimore, Md.	15.00	13.00
Boston, Mass.	23.00	20.00
Cincinnati, Ohio	19.60	14.50
Chicago, Ill.	18.00	.....
Dallas, Tex.	25.00	.....
Denver, Colo.	30.00	.....
Detroit, Mich.	15.25	13.25
Fort Dodge, Ia.	19.70	17.00
Grand Rapids, Mich.	15.65	.....
Los Angeles, Calif.	30.00	30.00
Minneapolis, Minn.	29.00	22.00
Montreal, Que.	21.00	21.00
New Orleans, La.	.....	17.25
New York, N. Y.	16.99	.....
St. Louis, Mo.	23.20	20.00
San Francisco, Calif.	22.00	18.00
Seattle, Wash.	27.00	.....

	Lump per 180-lb. Barrel (net) Finishing	Common
Atlanta, Ga.	2.00	1.50
Baltimore, Md.	.....	12.00†
Boston, Mass.	3.35	3.10
Cincinnati, Ohio	.....	12.25
Chicago, Ill.	.....	1.40
Denver, Colo.	.....	2.95
Detroit, Mich.	11.50†	10.50†
Los Angeles, Calif.	3.00*	3.00*
Minneapolis, Minn.	1.70	1.40
New Orleans, La.	.....	1.75
New York, N. Y.	.....	3.69*
St. Louis, Mo.	.....	.70*
San Francisco, Calif.	.....	1.90
Seattle, Wash.	3.25	2.75

*280-bbl. (net). †Per ton.

Portland Cement

Current prices per barrel in carload lots, f. o. b. cars, without bags.

Atlanta, Ga. (bags)	3.45
Boston, Mass.	2.61
Cedar Rapids, Ia.	2.21
Cincinnati, Ohio	2.35
Cleveland, Ohio	2.26
Chicago, Ill.	1.97
Dallas, Tex.	2.25
Davenport, Ia.	2.16
Denver, Colo.	2.69
Detroit, Mich.	2.17
Duluth, Minn.	1.94
Indianapolis, Ind.	2.21
Kansas City, Mo.	2.30
Los Angeles, Calif.	3.00@3.20
Milwaukee, Wis.	2.18
Minneapolis, Minn.	2.24
Montreal, Can. (sacks 20c extra)	2.40
New Orleans, La.	2.80
New York, N. Y. (includes bags)	2.40
(10c per bbl. discount in 10 days)	
Pittsburgh, Pa.	2.02
Portland, Ore.	3.05
St. Louis, Mo.	2.10
San Francisco, Calif.	2.63
St. Paul, Minn.	2.24
Toledo, Ohio	2.20
Seattle, Wash.	2.94

NOTE—Add 40c per bbl. for bags.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco* Calcined Gypsum	Cement‡ and Gauging Plaster	Wood Fiber	White§ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	——Plaster Board—— ¼x32x36" Weight 1500 lbs. Per M Sq. Ft.	⅜x32x36" Weight 1850 lbs. Per M Sq. Ft.	Wallboard, ⅜x32 or 48", Lengths 6'-10', 1850 lbs. Per M Sq. Ft.
Alabaster, Mich.	3.00	4.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Blue Rapids, Kan.	3.00	4.00	6.00	8.00	10.00	10.50	10.00	.....	23.75	19.00	19.375	20.00	26.75
Douglas, Ariz.	.....	.....	6.00	13.00	.....	10.50@12.00	.....	.....	.....	11.50@13.50	.....	.....	.....
Fort Dodge, Ia.	3.00	3.50	6.00	8.00	10.00	10.50	15.45@22.00	.....	21.30	20.00	19.375	20.00	30.00
Garbutt, N. Y.	.....	.....	6.00	8.00	10.00	10.00	.....	7.00	.....	.....	.....	20.00	.....
Grand Rapids, Mich.	3.00	4.50	6.00	9.00	10.00	10.00	18.50	.....	27.75	21.00	19.38	20.00	30.00
Gypsum, Ohio	3.00	4.00	6.00	9.00	10.00	10.00	19.25	7.50	27.95	21.00	19.375	20.00	30.00
Loveland, Colo.	3.00	4.00	6.00	8.00	10.00	10.50	.....	.....	29.80	.....	.....	.....	40.00
Oakfield, N. Y.	3.00	4.00	6.00	8.00	10.00	10.00	20.20	7.00+	30.75	21.00	19.375	20.00	30.00
Piedmont, S. D.	.....	.....	6.00	8.00	10.00	10.50	.....	.....	32.25	.....	27.97	31.04	41.18
Plasterco, Va.	4.00	.....	7.00	8.00	10.00	10.00	20.90	.....	29.90	19.00	21.375	22.00	30.00
Winnipeg, Man.	5.50	5.50	7.00	15.00	15.00	15.00	.....	.....	.....	.....	28.50	.....	35.00

NOTE—Returnable Jute Bags, 15c each, $3.00 per ton; Paper Bags, $1.00 per ton extra.

*Shipment in bulk 25c per ton less; ‡Bond Plaster $1.50 per ton additional; +Sanded Wood Fiber $2.50 per ton additional; §White Moulding 50c per ton additional; ||Bulk; (a) Includes sacks.

News of All the Industry

Incorporations

The National Gypsum Co., Kansas City, Mo., has been incorporated for $100,000.

The Sand and Gravel Products, Ltd., Montreal, have been incorporated for $100,000.

The Brookeville Granite Quarries of Canada, Ltd., Winnipeg, Man., have been incorporated with a capital of $600,000.

The Queene Anne Sand and Gravel Co., Seattle, Wash., has been incorporated for $20,000 by R. E. L. Thomas and S. H. Crookes.

The Hochelaja Cement Co., Ltd., Montreal, has been incorporated with a capital of $3,000,000 to manufacture cement. Plans are being prepared for the plant.

The Woodhouse Crushed Stone Co., Ltd., Port Dover, Ont., has been incorporated with a capital of $40,000 to carry on the business of quarry masters and stone merchants.

The Kinzel Thompson Sand and Gravel Co., Knox county, Tenn., has been incorporated for $5,000 by W. J. Lang, C. E. Paxton, C. S. Todd, F. L. Conner and G. J. Oehler.

The Corning Stone Co. Corning, N. Y., has been incorporated for $10,000 to quarry building stone and manufacture crushed stone for concrete work and road building. Incorporators are R. O. Davison, R. O. Hayt and J. C. Smock.

The Hartung Stone and Gravel Co., Wauwatosa, Wis., has been incorporated for $100,000 and will operate stone quarries and gravel pits for producing washed gravel and crushed stone. Incorporators are T. A. Manning, Walter Hartung and W. B. Martin.

Sand and Gravel

The N. Q. Speer Sand Co., Goshen, Va., will open a deposit of glass sand at that place.

The Warren Sand Co., Buffalo, N. Y., plans to develop its sand deposits at Star Brick during the coming season.

The Ballou White Sand Co., Millington, Ill., is completing the installation of a complete air separation system for making fine dry silica in mesh from 60 to 150. It gets a very close size in each mesh. This system makes a very high grade "banding sand."

The United Stone Products Co., Pittsburg, Kans., has secured contracts for furnishing crushed rock on the north Broadway road, which will require thousands of tons. The Joplin and Pittsburgh Railway Co. is constructing a switch 800 ft. long to facilitate handling the rock.

Muscatine, Iowa.—Gravel plant operators on Muscatine Island are putting their plants in shape for a record production this season and mechanical improvements are being made to take care of the work. Contracts have been secured for practically all highway and pavement projects at Davenport and Clinton and for Federal aid highway contracts in Scott and Clinton counties which will absorb the entire output of the four big pits now in operation. The Hahn Muscatine Gravel Co. is shifting its operation to the east side of Stewart road. The Northern Gravel Co., the Automatic Gravel Products Co. and the Pearl City Gravel Co. are operating nearly to full capacity.

Quarries

The G. R. Bianchi Granite Co., Montpelier, Vt., has increased its capital stock to $100,000.

The Vermont Lime Products Corp., Mount Tabor, Vt., has been incorporated for $200,000 to quarry lime products and marble. Incorporators are P. F. McCormick and E. B. Fleming, West Rutland, and J. F. Burke, Rutland.

Luverne, Minn.—The National Concrete Materials Co. has a contract to furnish 36,000 drainage pipes for work in Nobles county and the Quartzite Quarries Co. will furnish more than 200 carloads of crushed rock for road work in the vicinity of Omaha.

The Hoosier Cut Stone Co., Bedford, Ind., has completed an order for 36 stone columns, each 33 ft. 8 in. in height, 4 ft. 9 in. diameter, weighing 48 tons and valued at $7500. The total value of the shipment is $270,000. The columns will be used in the new state office building at Harrisburg, Pa., and are considered the largest single pieces of stone ever produced in an Indiana quarry, if not in the country.

Cement

William Leithauser of the Western Construction Co., Winner, S. D., expects to open a cement plant in the near future.

Allentown, Pa.—Resumption by the Central Mill at Egypt, puts virtually all cement plants of the Lehigh region in operation, including the reserve units.

Utica, N. Y.—The first boatload of 150 tons of a consignment of over 500 tons of cement for the American Hard Wall Plaster Co. arrived at the Utica Barge Canal Harbor from New York. The remainder of the large consignment will come on two boats later. This was the first shipment into Utica over the barge canal.

Concrete Products

The American Cement Products Co. has been incorporated with a capital of $10,000 in Detroit, Mich.

The Brier Hill Cement Products Co. has been incorporated in Detroit, Mich., with a capital of $25,000.

The Crown Cement Block Co., Manhattan, N. Y., has been incorporated for $6,000 by L. Savareso, D. L. Vanore and B. De Luca.

The Granite Concrete Block Co., Ltd., Weston Road, Toronto, has made an addition to its office building, using its own product for the construction.

The Concrete Tile Machinery Co., Cicero, Ill., has been incorporated for $100,000 by E. E. Rose, C. O. Grandell, C. A. Sarlson, F. W. Iggberg and W. R. Haynie to manufacture and deal in concrete machinery, equipment, supplies, etc.

Dealers

The Davidson-Ayers Co., Detroit, Mich., has been incorporated for $20,000, to handle cement and other building material.

The Luehring Lumber Co., Menominee Falls, Wis., has been incorporated for $35,000 to deal in brick, cement, etc., by G. F. Luehring, E. Luehring and A. J. Weidner.

The Dahl Brothers Manufacturing Co. has been incorporated in Estherville, Ia., with a capital of $80,000, to deal in building material, by Alf. Dahl and Peter R. Dahl.

The Consolidated Materials Co., Milwaukee, Wis., has been incorporated for $200,000 by H. Wilhelm, J. Rosenheimer and A. A. Grau to produce and deal in crushed stone, gravel, and other building and paving materials.

The Tapager Construction Co., Albert Lea, Minn., has been incorporated for $50,000 and will deal in sand, stone, gravel, cement, all kinds of building material, etc. Incorporators are C. M. Tapager, V. M. Jensen and R. W. Scott.

The Kelley Lake Sand and Gravel Co., Hibbing, Minn., has been incorporated for $20,000 by H. Murphy, W. C. Barrett and T. Hayes to deal in sand, gravel, lime, cement, general contracting, building, etc.

The Schoenwetter Lumber Co., Milwaukee, Wis., has been incorporated for $35,000 and will deal in wholesale and retail lumber, wood and all building materials, cement, etc. L. F. Schoenwetter, Minnie F. Schoenwetter and A. E. Severson are the incorporators.

Manufacturers

The Raymond Bros. Impact Pulverizer Co., Chicago, has recently established permanent Western offices at 1002 Washington building, Los Angeles, Calif. This office will be in charge of W. B. Senseman, who has had large experience in erecting, operating, and furnishing Raymond equipment for the fine grinding of all materials.

The Bucyrus Co., South Milwaukee, Wis., has under way extensive enlargements to both its plants at South Milwaukee and Evansville, Ind. These changes and rearrangements are planned to take care of its increasing volume of business and to enable it to manufacture more economically. In the South Milwaukee plant, where all the larger machinery is built, a new gray 276-ft. iron foundry is under construction. The old gray iron foundry is being converted into a cleaning room with annealing ovens, sandblast rooms and a welding room. A large addition is also being made to the steel foundry molding floor, and an electric furnace is being installed. Extensive improvements are also being made in the foundry storage yards. In the plant at Evansville, Ind., which specializes in the manufacture of small revolving shovels, the machine and erecting shops are being considerably enlarged to enable the company to handle its increasing business in these machines.

Personal

A. S. Sorenson has been elected vice-president and a member of the executive committee of the Illinois Concrete Aggregate Association to fill the place made vacant by the resignation of G. P. Longwell.

William H. McMahon, connected with the offices of the Illinois Concrete Aggregate Association at Chicago, has tendered his resignation, to take effect on June 1. Mr. McMahon has been long in the service of the association and his many friends express their regret that he is leaving.

William F. Benzel, Bedford, Ind., has been named the Indiana agent for the Doyle Stone Co., Inc., a New York corporation, which has qualified to do business in Indiana. The company has 500 shares of stock in Indiana and will do a general quarrying and construction business.

Dr. R. B. Moore, chief chemist of the Bureau of Mines, sailed on May 6 for England, preparatory to spending two months in European countries to obtain data desired in various problems in the work of the bureau along chemical and mineral technology lines. Dr. Moore will also represent the Chemical Warfare Service and other Federal bureaus engaged in chemical research. He will spend some time in England, Germany, Austria, France, Czechoslovakia, Holland and Belgium.

Trade Literature

Crusher—The Dixie Machinery Mfg. Co., 3665 Market street, St. Louis, Mo., announces that its new catalog giving full information on the Dixie Mogul crusher is now ready for distribution.

The American Cement Directory for 1922—This authoritative compilation of the cement industry has recently come off the press in its usual neat and attractive form, published by the Bradley Pulverizer Co., Boston, Mass. It contains some 68 pages of lists of cement manufacturers, including the names of a dozen or more foreign companies.

"How to Use Coal" is the title of a folder issued by the Cal Chemical Co., Inc., Hagerstown, Md., in which is included descriptive matter setting forth the merits of "Cal," a chemical powder which is said to produce the set and strength of concrete in approximately half the time, without injurious effect on the ultimate strength. It also contains the favorable report of the U. S. Bureau of Standards.

Buyers' Bulletin

MANUFACTURERS OF MACHINERY AND EQUIPMENT:—These inquiries are live, up-to-date inquiries that have come direct to us from the individual in each case.

READERS OF "ROCK PRODUCTS":—This Department is for your special help and service. If you do not see what you require advertised in "Rock Products," tell us your needs and we will publish them here. There is no charge for this service.

The N. Q. Speer Sand Co., Goshen, Va., write us as follows: "We will open at this place a deposit of glass sand and we need complete equipment for plant, including the usual machinery for quarrying, crushing, screening and drying the product. Power necessary will include boiler for dryer and internal combustion engine for part of the work. Would like to have prices on rails for tramway, jaw crushers, screens, car loaders and conveying machinery."

Western Construction Co., Winner, S. Dak., writes as follows: "The writer expects to be in the market for machinery and equipment for a cement plant in the near future and would be pleased to be put in touch with manufacturers of the same."

J. W. Ramage, Gallup, N. Mex., asks to be put in touch with manufacturers of brick making machinery; wants machinery to make about fifty thousand wire cut brick per day, the principal material will be clay or adobe, very little shale.

The Lincoln Sand & Gravel Co., Lincoln, Ill., write: "We are interested in securing information about oil engines up to 250 h.p. Will you kindly put us in touch with reliable firms making this class of equipment?"

T. K. Terrell, R. F. D. No. 1, Lynchburg, Va., wants catalogs and prices on pulverizer or mill for grinding raw bones.

American Stone Ballast Co., High Bridge, N. J., advise that they are in the market for new and second hand 2-yard quarry cars, side-dump, closed ends for 36-in. gauge track.

Fredonia Portland Cement Co., Fredonia, Kan., advise that they are in the market for machinery for making wood fibre for use in plaster and mixing machines for mixing wood fibre with plaster.

Zeller's Concrete Materials Co., Watertown, S. Dak., write: "We are in the market for a small rock crusher that will handle 6-in. boulders. Will pay cash for a good second hand crusher."

Albany Concrete Stone Co., Albany, N. Y., write: "We are in the market for a used, self-propelled wagon loader to load from ground storage to trucks. As we only have about 5,000 tons of crushed stone to load we cannot afford a very expensive machine."

Des Moines Sand & Fuel Co., Gaylord Gray, Des Moines, Iowa, want to buy one direct-connected 5-in. or 6-in. water pump. Gould preferable. Capacity 800-1000 gal. per minute, 90-ft. head suitable 440 volt.

Humboldt Gravel & Tile Co., Mr. Goodrich, Humboldt, Ia., want 200 feet of 6-in. second hand wrought iron or spiral riveted, water pipe, for use in pumping sand and gravel. Must be in good condition.

Waverly Sand & Gravel Co., W. M. Brooks, Waverly, Iowa, want a cable way, about 1½ yd. bucket and 800 ft. space and hoist. Prefer electric hoist, but if plant suits otherwise, would not object to steam hoist. Machinery must be in good condition and ready to run. Either new or second hand.

Ottumwa Sand Co., Mr. A. L. Mickesh, Ottumwa, Iowa, want buckets for 35-ft. conveyor belt, 10-in. wide.

The Wabee Gravel Company, Milford, Indiana, is in the market for a sand box capable of handling from 25 to 35 yards per hour. If you have such a sand box for sale, please communicate direct with the above company.

Classified Advertising

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid for in advance of insertion.

FOR SALE

92 acres of high calcium limestone, the purest limestone in the United States. Analysis 99.10 calcium carbonate. Located at St. Genevieve, Mo. For full particulars apply

J. F. SCHUERMANN
Syndicate Trust Bldg. St. Louis, Mo.

POSITION WANTED

Superintendent, fully experienced in Quarry, Crusher, Lime Kilns, Well Drilling, Steam Shovels and Office Work. Can produce results.

Box 1562, Care of Rock Products
542 South Dearborn Street, Chicago, Ill.

SUPERINTENDENT

With twenty years' experience in construction and operation of large crushing plants, quarry operations using steam shovels and modern equipment; also cement mill and pulverizing experience, will be open for engagement after June 1st. Address

Box 1564, Care Rock Products
542 South Dearborn Street, Chicago, Ill.

FOR SALE

Stone crushing plant complete, in Elk County, Pennsylvania, with well developed glass sand stone quarry. Farm of 300 acres with buildings, fruit trees and timber in connection. Present owner unable to give proper attention. Price reasonable; terms to suit. Address

Box 1566, Care Rock Products
542 South Dearborn Street, Chicago, Ill.

SUPERINTENDENT-MANAGER

Wishes to enter into preliminary negotiations with plaster producer with idea of engagement; technically trained; chemical engineer; executive ability; seven years' experience; thoroughly competent in all phases of gypsum plasters. Western or midwestern location preferred. Address

Box 1565, Care Rock Products
542 South Dearborn Street Chicago, Ill.

POSITION WANTED

Superintendent with 20 years' experience in sand and gravel plants. Can keep up and overhaul all sand and gravel machinery. Experienced in long distance pumping. Want to connect with responsible firm. Available now. Can furnish first class references. Address

Box 1567, care of Rock Products
542 South Dearborn Street Chicago, Ill.

POSITION WANTED

Having disposed of my interests in the Sand and Gravel Business am now open for something in the same line; have had eight years' experience; have had the entire management of our company, and am capable of taking entire charge of, or will take any position with chance for advancement. I know what it takes to make a gravel plant go and pay dividends, and I believe I can satisfy anyone needing a competent man to share some of the burden that goes with the business, and would be pleased to hear from anyone needing help. Have had experience with pumps, belt conveyors, cableways, drags, and industrial machinery; also the different kinds of screening plants. Address

Box 1559, Care Rock Products
542 South Dearborn Street, Chicago, Ill.

FOR SALE

2000'—16-lb. Track, 30" gauge.
12—1-yd. U Dump Cars, 30" gauge.
5—Turntables.
6—End Dump Quarry Cars.
2—Gable Side Dump Cars.
New and Relay Rails.

IVANHOE EQUIPMENT CO.
1130 Ivanhoe Road Cleveland, Ohio

BURNERS WANTED

For cement burning. Must be familiar with oil burning. Write

Monolith Portland Cement Company
Monolith, Calif.

Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion

IMMEDIATE DELIVERY

SEND US YOUR STEAM SHOVEL INQUIRIES

66x86 in. TRAYLOR JAW CRUSHER.
No. 18K GATES CRUSHER.
50-75 HP. Single Drum Hoists, 25 Cy. Motors.
25-40-50 HP. D.D. Hoists, 60 Cy., 220-440 V., 3 Ph.
Nos. 3-5-6-7½ & 8K CRUSHERS.
6 and 12 ton Gasoline Locomotives.
10x12 in. Steam Hoist, 3 Drum.
2—DISC CRUSHERS, 36" SYMONS.
2 — 60 ft. BARBER-GREEN 18" BELT CONVEYORS.
100 TON 2½ YD. ELEC. SHOVEL.
50 to 5000 ft. Steam, Belt & Elec. Compressors.
JAW and ROLL CRUSHERS.
10-15 & 20 Ton Locomotive Cranes.
13x30 in., 9x14 in. and Other Jaw Crushers.
24x54 McLANAHAN ROLL CRUSHER.
Send us your inquiries for Steam Engine, Centrifugal Pumps, Quarry & Cont. Equip., Etc.

ROSS POWER EQUIP. CO., Indianapolis, Ind.

FOR SALE

2—8x110' Rotary Kilns
6—5x6x7x110' Rotary Kilns
3—6x16' Tube Mills, Silax Lined
9—5x21' Tube Mills, Steel Lining
6—250 H.P. Oil City Water Tube Boilers
1—Coal Dryer
1—Rock Dryer
8—Krupp Ball Mills
1—No. 8 Austin Crusher
4—Engines, 200 to 500 H.P.
8—33" Fuller Mills
8—42" Fuller Mills

Shafting, Pulleys, Bearings, and Elevator Equipment, All First-Class Operating Condition

50 Acres of Land and Five Buildings, Stone and Steel Construction. Located at Stockertown, Pa.

ENGINEERING SALES CO., Nashville, Tenn. OLLIE LAWRENCE, Stockertown, Pa.

Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid for in advance of insertion.

RETURN TUBULAR LOCOMOTIVE BOILERS WATER TUBE SCOTCH MARINE

A LARGE STOCK OF HIGH-GRADE BOILERS OF PRACTICALLY ALL SIZES, TYPES AND MAKES, TAKEN OVER FROM DU PONT CHEMICAL COMPANY'S AND OTHER PLANTS WITH PRODUCTION RECORDS—RECONDITIONED, OFFERED SUBJECT TO ANY INSPECTION, AVAILABLE *NOW!*

"SAVE TIME AND MONEY ON YOUR POWER INSTALLATION—LET DAVIS FURNISH THE BOILERS"

LONG DISTANCE TELEPHONE RANDOLPH 2232

J. F. DAVIS

1122-1123-1124 Harris Trust Building CHICAGO, ILL.

New Large Screens Cheap

78"x25' revolving screen, manganese steel plates 1" thick, holes 1½" diameter.

78"x20' revolving screen, manganese steel plates 1½" thick, holes 5" diameter.

15 complete belt conveyor outfits, all new for 18", 20", 24", 30" and 36" belts.

156' 42" 10-ply bucket elevator belt, with pulleys, gears, etc.—New.

Wm. C. Johnson & Sons Machy. Co.
1001-3-5 N. 6th St. St. Louis, Mo.

New—RAILS—Relaying

All sections on hand for quick shipment. Reasonable prices quoted. Our stock is very complete.

M. K. FRANK
Frick Building Pittsburgh, Pa.

QUARRY EQUIPMENT

4—20 yd. Steel Underframe Side Dump Cars.
3—16 yd. Steel Underframe Western Dump Cars.
10—1¼ yd. Western Dump Cars.
2—10x16 Davenport 36 in. ga. Saddle Tanks.
1—11x16 American 36 in. ga. Saddle Tank.
1—9x14 Porter 4 ft. 8½ in. ga. Saddle Tank.
1—⅝ yd. Thew "O" Traction Shovel.

Walter A. Zelnicker Supply Co., St. Louis

"DREDGING PUMP" FOR SALE

One 10" Morris Sand and Gravel dredging pump, 10" suction, 10" discharge, direct connected to double 9x9 engines.
One Scotch Marine Boiler, 200 H. P.

M. A. CALLAHAN
"The Sand Man"
Schofield Bldg. Cleveland, Ohio

FOR SALE

One Model 60 Marion Steam Shovel, 2½-yd. dipper. Twelve 6-yd. Western Dump Cars, steel sills, steel lined ends and bottom, air brake equipment. One No. 5 Gates "K" Crusher, extra head, gear and pinion. The above equipment is in excellent condition and ready for use. Located in Texas. Address

BOX 617, CORSICANA, TEXAS

FOR SALE

1—42-ton Standard gauge Baldwin Mogul, 160-lb. Steam.
1—36-ton Standard gauge Baldwin Mogul, 11' wheel base.
2—50-ton Standard gauge Brooks 6-wheel switchers, 160-lb. steam.
1—50-ton Standard gauge Shay geared locomotive.
1—42-ton Standard gauge Shay geared locomotive.
2—23-ton brand new 36" gauge Porter 6-wheel switchers, separate tenders.
2—18-ton O & S 8-wheel two-line locomotive cranes.
1—14-B Bucyrus Steam Shovel, mounted on traction wheels.

Birmingham Rail & Locomotive Co.
Birmingham, Ala.

Bucyrus Steam Shovel Parts

We are now dismantling a 65-ton 2½-yd. Railroad Shovel. The majority of parts are in good condition. If interested advise requirements.

Walter A. Zelnicker Supply Co., St. Louis
Rails-Cars-Locomotives-Hoisting Engines-Tanks

WANTED

3 drum, 10x12 Hoisting Engine. Without Boiler.

Evansville Sand & Gravel Co.
Evansville, Ind.

WANTED

A compressed air operated hollow steel drill sharpening machine. Quote lowest price, condition and where located.

Box 301, Davenport, Iowa

FOR RENT AND FOR SALE

20—12-yd. Westerns, like new, std. gauge.
50—60,000-lb. capacity flat and box cars.
1—Western standard gauge spreader.
1—Osgood 18 revolving shovel, traction wheels. No. 794, ¾-yd. bucket, used 8 months.
1—Class 14 Bucyrus dragline on caterpillars, 70-ft. boom, 2-yd. bucket, used 6 months.
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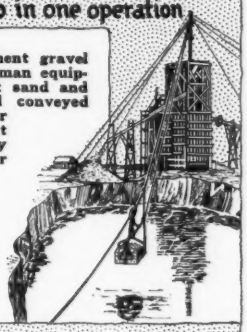

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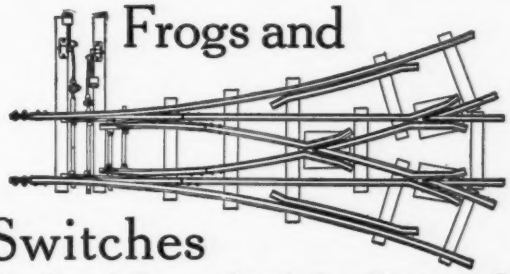

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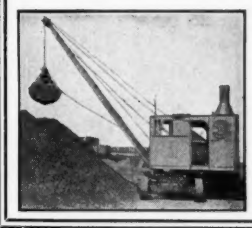

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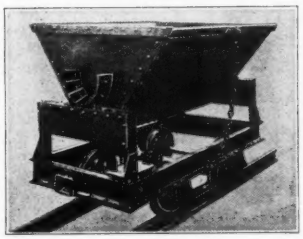

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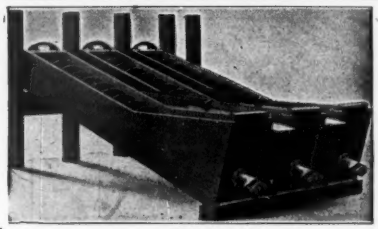

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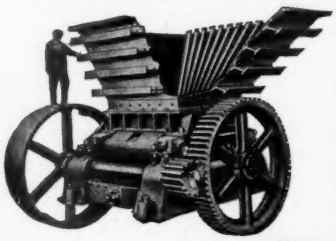
"PENNSYLVANIA" Single Roll Crusher



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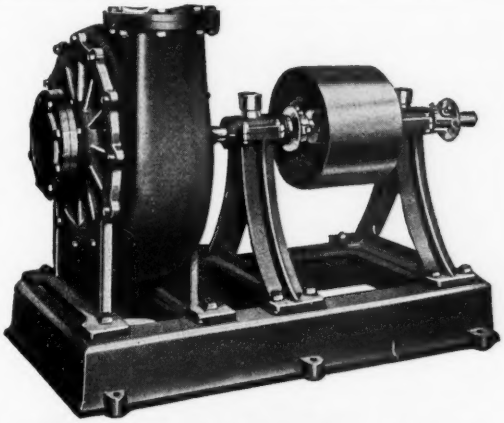

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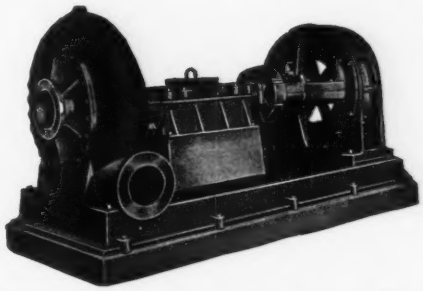

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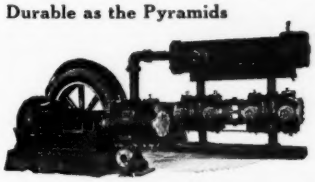

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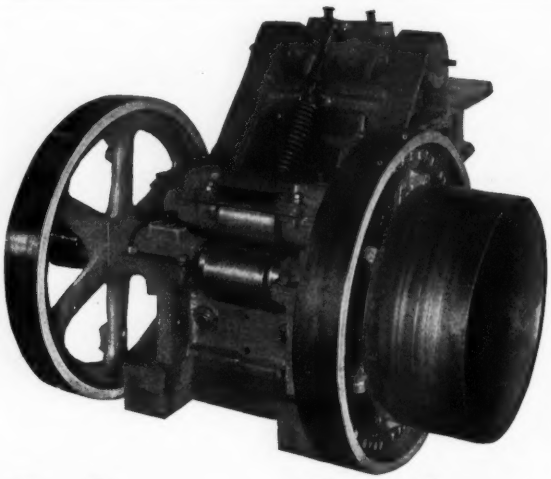

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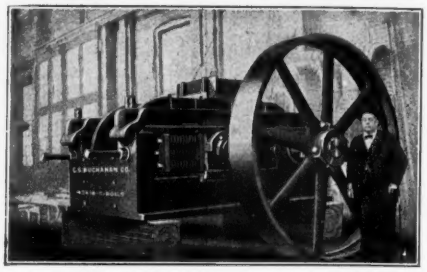

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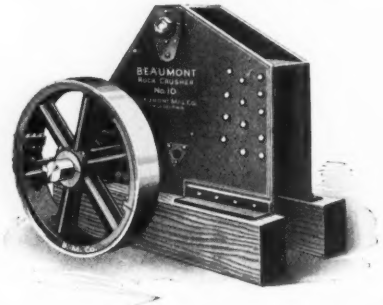

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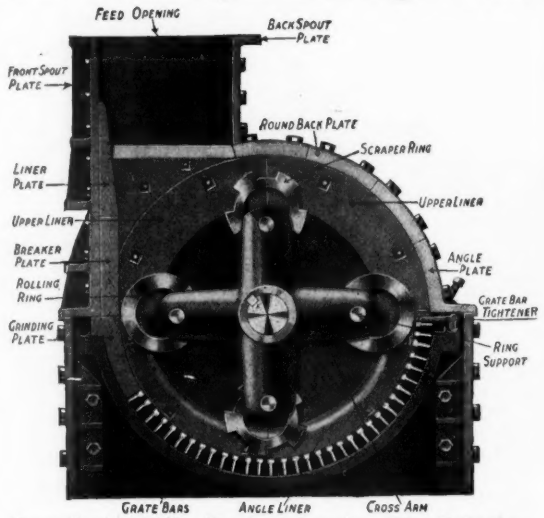

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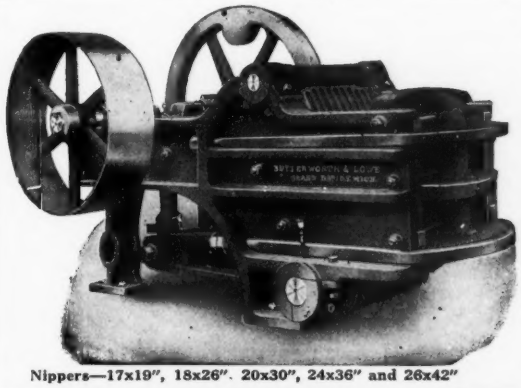

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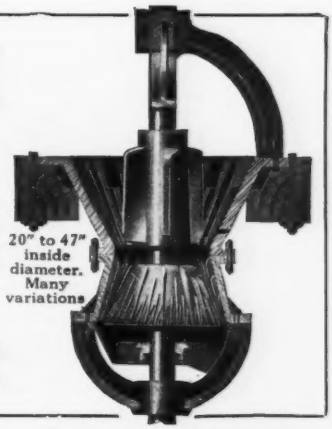

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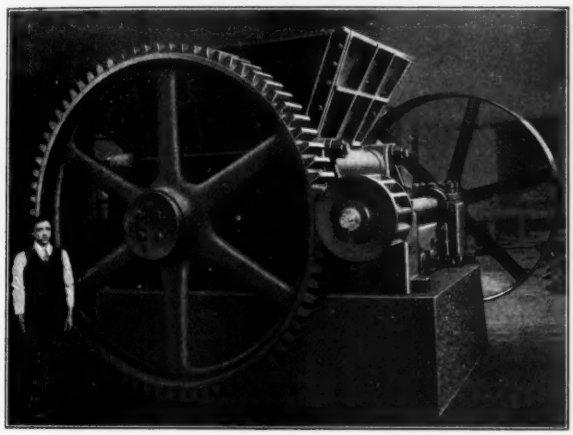

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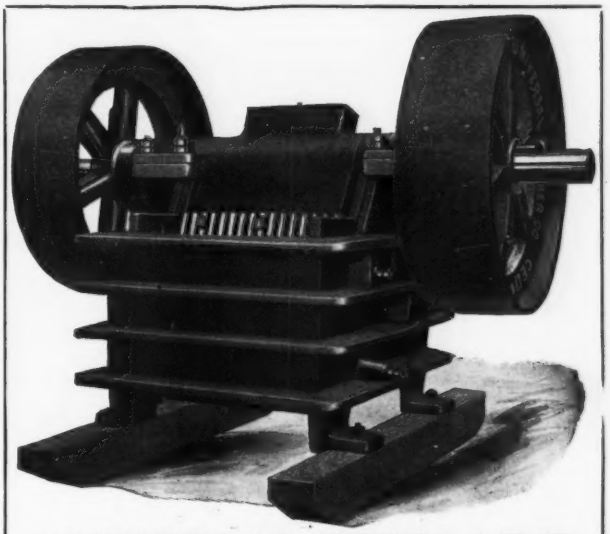

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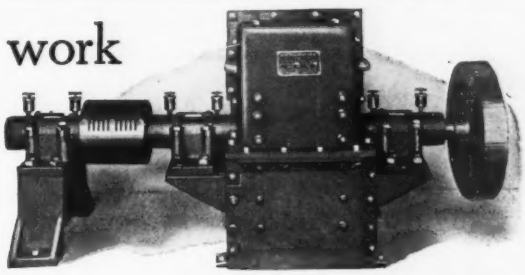

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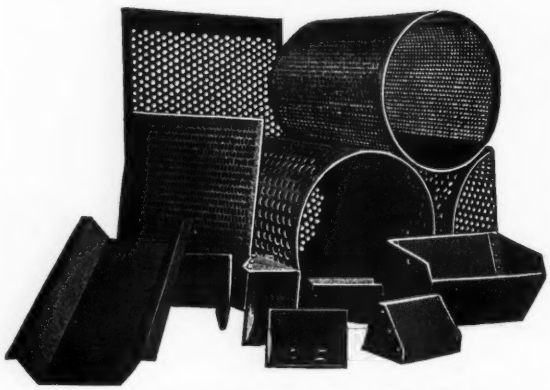

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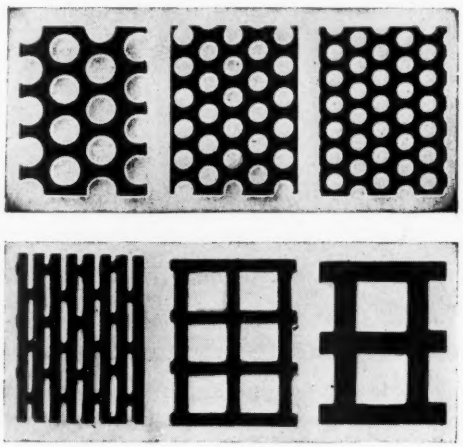

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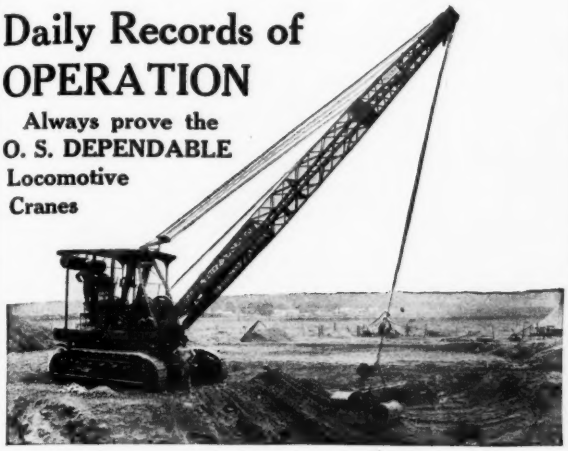

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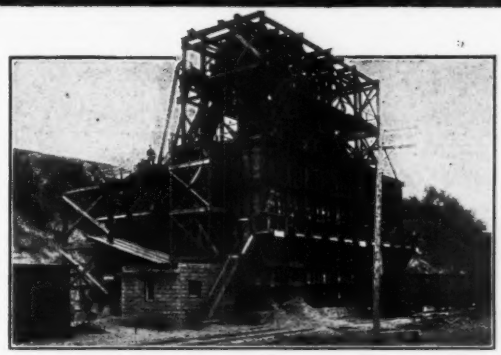
ERIE Revolving Shovels

Clean Sand



This plant produces CLEAN SAND. The dependable

G-R-M SAND SETTLING TANK

does the work. The sand is WASHED AND DRAINED

Fine sand may be rejected at will by the use of the adjustable overflow

No matter how dirty the sand, the G-R-M Sand Settling Tank will clean it. It churns up the sand, loosens the dirt, and floats the foreign matter off at one end, while the clean sand is taken out from the other end.

SEND FOR INFORMATION—USE THE COUPON

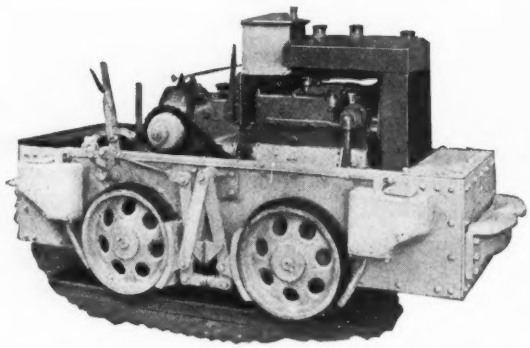
GOOD ROADS MACHINERY Co. 1203 Tower Bldg., Chicago

Good Roads Machinery Co., 1203 Tower Bldg., Chicago, Ill.
Gentlemen: You may send me additional information concerning the G-R-M Sand Settling Tank.

Name_____

Address_____

We are now washing_____ tons of sand per day.



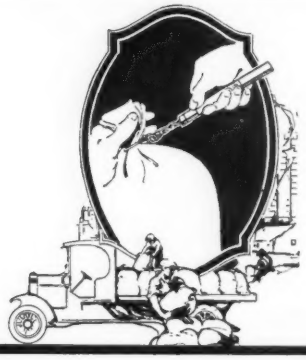
An Atlas Gasoline Locomotive
for $1400.00

Having drawbar pull of 1500 lbs.
This is a sturdy, substantial, effective locomotive that will stand up to its job and perform.

"You can't afford to be without it"

Put Your Haulage Problem Up to Us

Manufactured by
THE ATLAS CAR & MANUFACTURING CO.
ENGINEERS MANUFACTURERS
CLEVELAND, OHIO



BATES WIRE TIES

have long since been universally accepted as the most secure, saving, and efficient means for closing bags of all sizes and descriptions.

OVER THREE HUNDRED MILLION BAGS were closed the Bates Way during 1921 in the Rock Products Industries alone.

A Free trial of Bates Wire Ties will convince you and will show you how we save time and money for our big family of satisfied customers.

A Free Trial Outfit

consisting of one tying tool and liberal samples of wire ties suitable for your purposes will be gladly sent upon receipt of your agreement to try it on your work and within fifteen days send us $3.50, the price of the tying tool, or return it to us. The sample wire ties cost you NOTHING.

BATES VALVE BAG COMPANY

7326 South Chicago Ave. Chicago, Ill.
110 Great Portland St. London, W. I., England

The Clyde Lime Hydrator Performance Counts

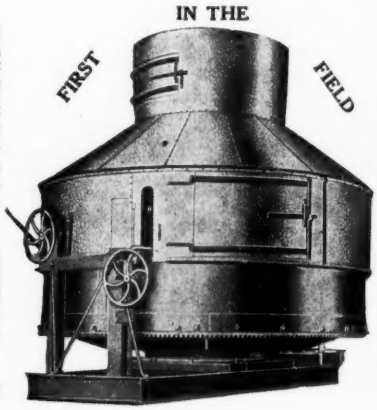
The Clyde was first in the field, and through dependable and economical performance is still first choice of lime operators.

The Clyde Hydrator produces big capacities of lime at only three-fifths the cost of any other hydrator on the market.

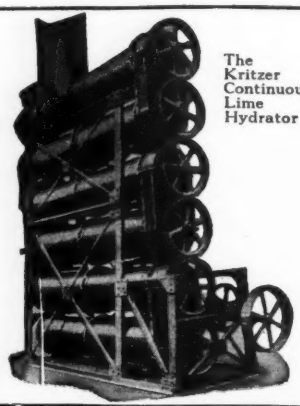
The Clyde not only produces over 90% of the hydrate of America, but makes the best quality of finishing lime from either high calcium or magnesium.

Simple, easiest to operate and most economical in cost of installing, maintaining, and operating.

Send for Catalog



H. MISCAMPBELL
Patentee and Sole Manufacturer
DULUTH - - MINNESOTA



The Kritzer Continuous Lime Hydrator

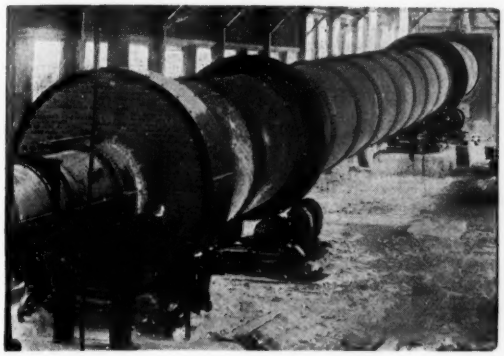
HYDRATE

Years ago we helped our customers create a demand for their hydrate. Today the demand exceeds the supply. That's why every lime manufacturer should have an efficient, economical hydrating plant.

THE KRITZER Continuous Lime Hydrator is efficient in production and economical in operation and maintenance. Let us investigate exhaustively the local conditions peculiar to your proposition, and then apply our experience of many years and design a plant to meet those conditions.

A KRITZER plant, scientifically adapted to your conditions, will give you the best product at lowest cost

THE KRITZER COMPANY
503 South Jefferson Street CHICAGO, ILL.



Labor costs are frequently halved when vertical kilns are replaced by Vulcan Rotary Kilns.

—Also rotary kilns can be used for a great variety of processes and materials, where a vertical type cannot be employed.

The upkeep of the rotary kilns is less than that of any other type of kiln. It requires little attendance, wears for years and makes a relatively small demand upon the power plant. It has a high fuel efficiency, requiring from 20 to 30 per cent less fuel than the vertical kiln of the same capacity. It operates under continuous feed and discharge, and can be adapted to a variety of fuels.

VULCAN Rotary Kilns are a factor of economy in sixty-five industrial and manufacturing processes.

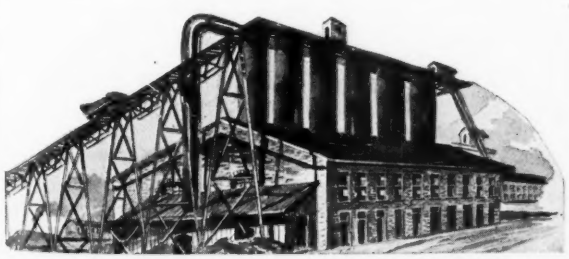
It may be the gateway to economical production in one of your processes.

Your inquiry is solicited.

Vulcan Iron Works

"Established 1849"

1753 Main Street Wilkes-Barre, Pa.



Complete Equipment Plus Engineering Service

PLANTS equipped under the Allis-Chalmers plan of "Undivided Responsibility" include the complete apparatus necessary for their successful operation.

With the apparatus designed by its own engineering staff and built in its own shops, the Allis-Chalmers organization is able to include the complete equipment in a single contract, thus saving a purchaser the burden of handling the many details, disputes, delays and oftentimes expensive complications arising where a number of separate contracts are involved.

Allis-Chalmers engineering service is of the utmost value to a user in the selection of equipment suited to his particular conditions and in its economical operation for maximum plant efficiency.

Of particular interest to Rock Products readers is the following Allis-Chalmers Equipment:

- Crushing Machinery
- Complete Crushing Plants
- Cement Machinery
- Complete Cement Plants
- Dust Collecting Systems
- Powdered Coal Plants
- Air Compressor Equipment
- Centrifugal Pumps and Pumping Units
- Electric Motor Drive and Control Equipment
- Power Units with any Type of Prime Mover
- Complete Electrical Equipment "from Prime Mover to Switchboard"
- Power Transmission Machinery

ALLIS-CHALMERS

Manufacturing Company

Milwaukee, Wis., U. S. A.

District Offices in All Leading Cities.

METRO NITE

for Stucco

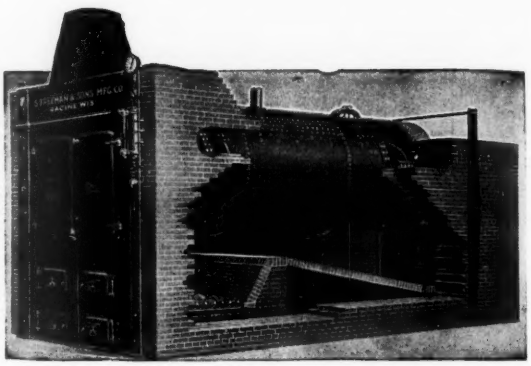
Metro-Nite White is a siliceous dolomite, extremely hard, sharp, cleanly graded and makes a bright, sparkling face for stucco buildings, concrete bricks or blocks.

It is generally accepted as the most beautiful and artistic facing known for this purpose, and we will gladly send samples to anyone who is interested in carload lots.

Metro-Nite can be delivered either in white or green.

THE METRO-NITE CO.
333 Hartford Ave., Milwaukee, Wis.

FREEMAN
Horizontal Return Tube High Pressure Boiler



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Freeman Manufacturing Co.
Main Office and Works, Racine, Wisconsin, U. S. A.

Free Service to Readers of
Rock Products

If you are in the market for any kind of machinery, equipment or supplies, or if you desire catalogs, information or prices on any product, we are at your service—to obtain for you, without expense, catalogs, prices or specific information on every kind of machinery, equipment and supplies—or to help you find the hard to find source of supply.

RESEARCH SERVICE DEPARTMENT
ROCK PRODUCTS, 542 So. Dearborn St., Chicago, Illinois

Please send me catalogs and prices concerning the following items:

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Name.....

Address.....

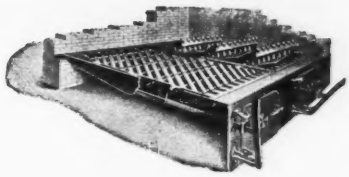
City..... State.....

McGINTY GRATES

The engraving shown here illustrates the addition to the Washington Building Lime Co. plant at Woodville, Ohio.

This addition, which was erected by Arnold and Weigel, consists of four new kilns, all equipped with McGinty Grates, a total of 16 sections of grates.

The service ability of these grates, demonstrated in so many lime plants throughout the country, explains in a measure why they are so generally recognized as a sound investment. They are shaking and dumping grates that will burn a deeper bed of fuel than the old style bars would permit, and they will stand a higher degree of heat without warping than any other grate now on the market.



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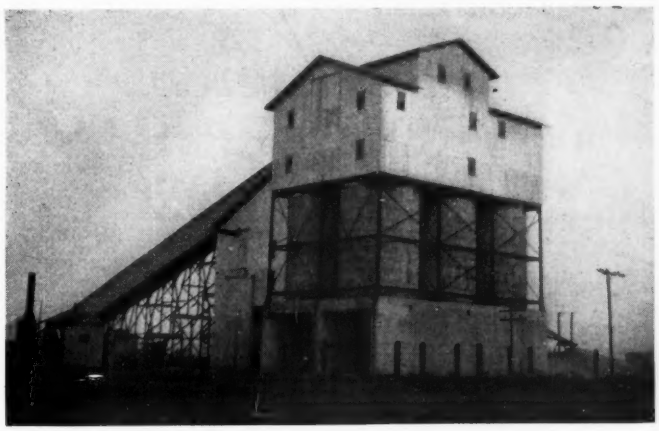
The Kramer Bros. Foundry Co.
Dayton, Ohio

LET NEFF & FRY DO IT

Let us build your storage bins. We build them for every need and every purpose, build them of concrete staves, puddled or power tamped, 2½ or 3½ in. thick, concrete blocks 8 in. or monolithic with 6-in. wall.



Six Neff & Fry Bins at Keystone Gravel Co., Dayton, Ohio

We will assume all of the responsibility, will do all the erecting and give an ironclad guarantee.

We will modernize your methods, beautify your yard, increase your business and save you money.

Write for catalog, or better still, let us know your needs, and we will advise you, without obligation the size and type of bins best suited to your requirements.

Three factories located at Kalamazoo, Mich., Peoria, Ill., Camden, Ohio, insure low freight rates

NEFF & FRY, Camden, Ohio

Eastern Office—736 Drexel Building, Philadelphia, Pa.
General Office—Camden, Ohio

"A WILLING WORKER"

It is sometimes difficult to get the first olive out of the bottle, but after you get the first one the rest comes easy.

It's the same in selling Type "J" Locomotive Cranes. Sell one Type "J" and repeat orders follow.

WHY?

Because it is a regular "honest to goodness" crane, big by comparison, both in size and service.

It is human nature to like a willing worker, one that does a full day's work, day after day, without interruption or without coaxing.

Try out the type "J" and its operation will speak more convincingly than anything that can be said of its merits.

The McMyler Interstate Company
Cleveland, Ohio LC-108

BRANCH OFFICES:

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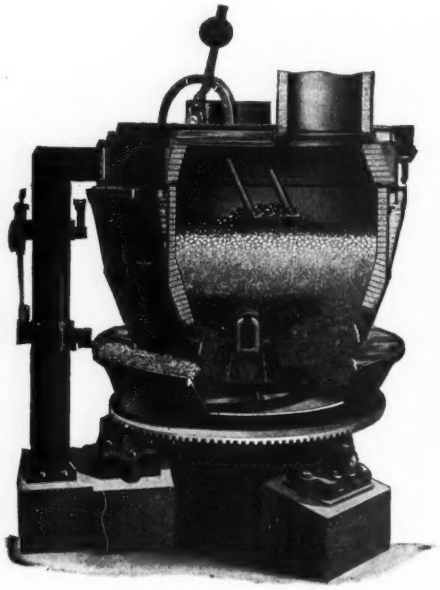
Chicago, Illinois	812 Edison Building
Seattle, Washington	Hoge Building
Denver, Colorado	18th and Wazee Streets
San Francisco, California	766 Folsom Street
New Orleans, Louisiana	444 Maison Blanche Annex
Birmingham, Alabama	Brown-Marx Building
Boston, Massachusetts	261 Franklin Street

The Machine of Absolute Satisfaction

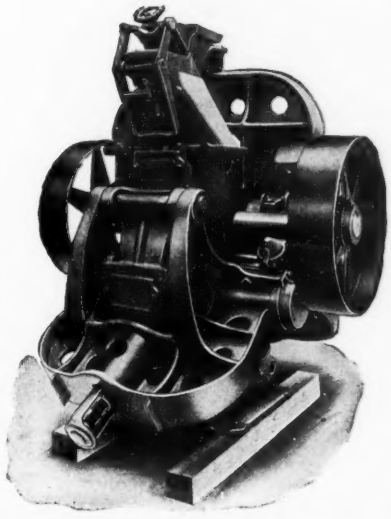


Selected by every large purchaser in the steel industry since the armistice. Three recent installations at leading Eastern Lime Plants.

POKERLESS PRODUCER-GAS MACHINE

Users everywhere testify with one voice to the superior satisfaction and low maintenance expense of this splendid machine. Difference in first cost comes back annually; every detail built for endurance.

MORGAN CONSTRUCTION CO.
Worcester, Mass.
Pittsburgh Office 704 Arrott Bldg. · Telephone Court 1381



MAXECON

Preliminary Grinder for Tube Mills

LIMESTONE ..... 20 to 40 Mesh
CEMENT CLINKER ..... 20 to 60 Mesh

MAXECON MILL
PERFECTECON SEPARATOR

The UNIT that has LARGER OUTPUT with LESS POWER WEAR and ATTENTION than any other.

It will be to the interest of those who operate CEMENT PLANTS to know what the Maxecon Unit will do.

Drop us a line **We will be glad to tell you about it**

Kent Mill Company
10 Rapelyea Street **BROOKLYN, N. Y.**

Here is the Solution to Your

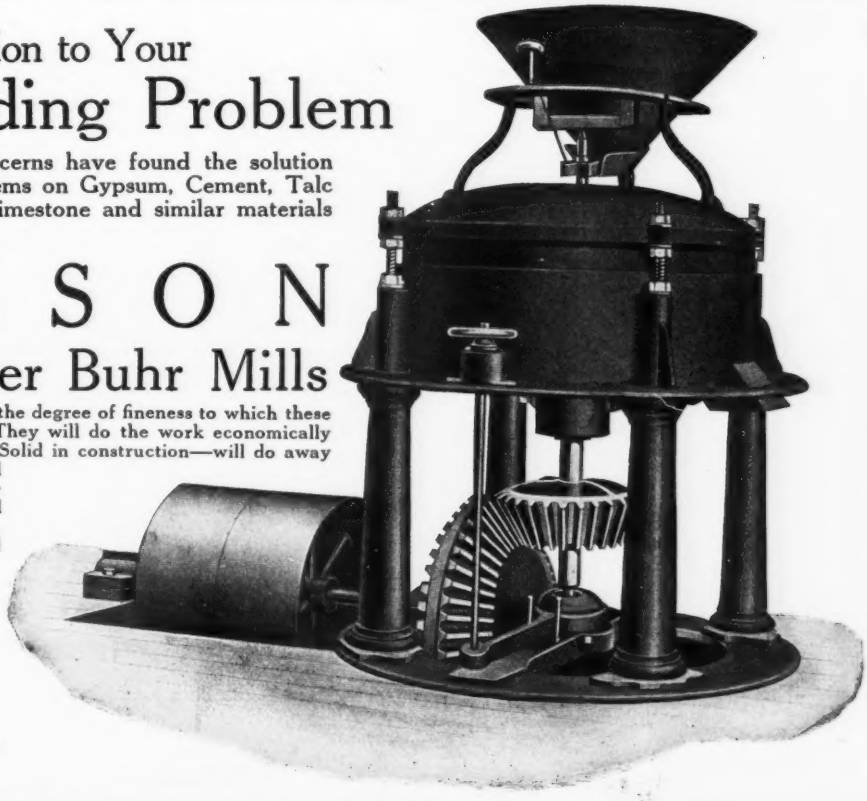
Fine Grinding Problem

Many of the leading concerns have found the solution to their fine grinding problems on Gypsum, Cement, Talc and Soapstone, Graphite, Limestone and similar materials by installing

M U N S O N

Under Runner Buhr Mills

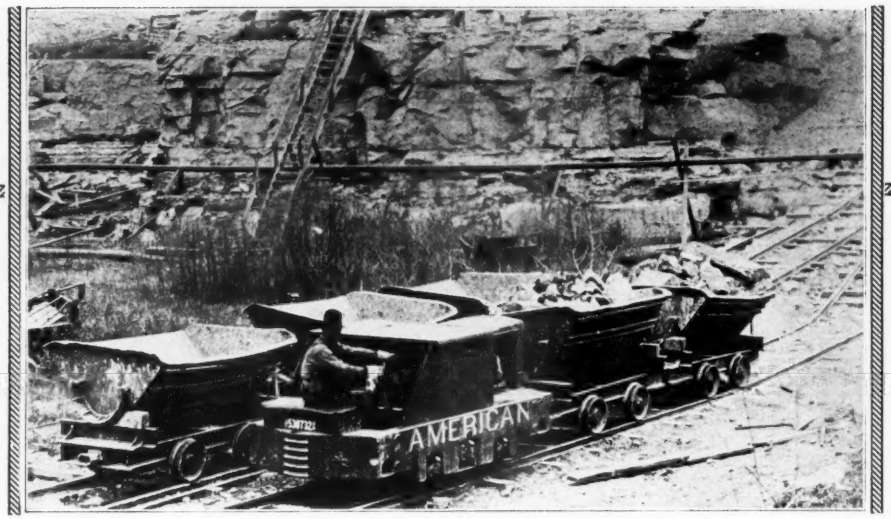
There is practically no limit to the degree of fineness to which these mills will grind these products. They will do the work economically and satisfactorily in every way. Solid in construction—will do away with delays and shut-down and keep out of the repair shop. Their Automatic Adjustment, Rapid Grinding and Perfect Balance Insure good results and fine and uniform grinding.



Why not investigate? Send for our new catalog, number 71

MUNSON
Mill Machy. Co., Inc.
Utica, New York

This American Gas-O-Motive Saved This Quarry $10,000 Last Year



This American Gas-O-Motive Saved This Quarry $10,000 Last Year

Greater Production and Lower Costs

are assured when the American Gas-O-Motive is on the job.

The powerful and trouble-free performance which has made the American so efficient, is due to the finer engineering design, better materials, and closer precision of manufacture. This machine has clear vision — straight ahead, instant control of speed in either direction, brakes and sanders on all four wheels, is made in sizes from 4 to 7 tons, and in all gauges from 24 to 56½ inches.

THE HADFIELD-PENFIELD STEEL CO. **BUCYRUS, OHIO**

Don't Put It Off

The sooner you buy a Shay, the more money you will save with it.

The Shay is a cost-reducing, money-saving locomotive. It keeps the rock moving, over rough track and around sharp curves; it spots quickly and accurately, helping your shovels to greater production; it requires only negligible maintenance attention.

May we send you our latest catalog?

As a first step toward the selection of a Shay that will reduce your hauling costs, ask us what a Shay will do on your job. We'll tell you, from knowledge and experience gained in a study of transportation problems.

LIMA LOCOMOTIVE WORKS, Incorporated

Lima, Ohio **17 East 42nd St., New York**

Ford Ton Truck Efficiency, Economy and Service

Applied to Industrial Railway Haulage through the use of Brookville Attachments, combined with the Ford Ton Truck power unit.

It is unnecessary to invest several thousand dollars in order to get away from slow and expensive horse or mule power. Most quarry operations work only during favorable weather conditions. Motor costs only while in actual operation, while horses and mules are a bill of expense the year round. This converted Ford Gasoline Locomotive will not only save you money over mule haulage, but in many instances will cut down operating expenses one-half over heavy, and slower machines double its weight.

Ford ton truck unit is left practically intact, giving the purchaser all the advantages of local Ford Service.

Our special auxiliary reverse Brookville transmission gives the Ford ton truck high and low operating speeds either direction. No necessity of turntables or "Y's" permitting of as many as four round trips hourly over track one-half mile in length.

Heavy auxiliary frames of sectional oak, 8" ship channel, and cast iron gives ample weight and traction.

Pivoted Hyatt roller bearing pony front permits motor working around any curve that the average industrial car will take.

Will handle from two up to twenty tons to trip on high gear, depending on track and grade conditions.

Four years on the market has proven machine has no competitor as to efficiency, economy, and service.

Submit us your haulage conditions and details. If excessive for the machine we will advise you frankly to that effect. If in its class will accept order from any reliable firm, subject to 10 days' approval. We can't offer more.

BROOKVILLE TRUCK & TRACTOR COMPANY, BROOKVILLE, PA., U. S. A.

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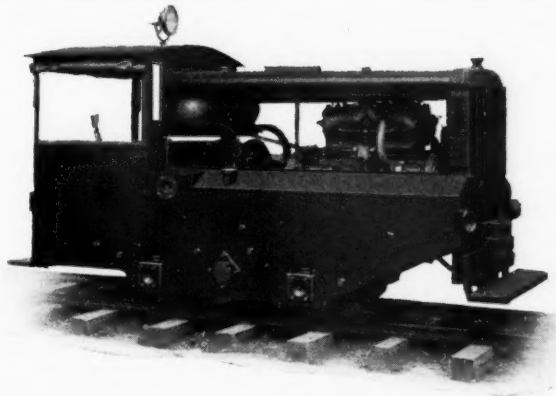
Minster Industrial Locomotives



Model "F" in 6-, 7- and 8-Ton Sizes

For Service and Lasting Economy

No other locomotive on the market surpasses the "MINSTER" in giving satisfactory service over periods measured by years.

**Where there is real work to be done—
You will find a "MINSTER"**

The Industrial Equipment Company

310-316 Ohio Street, Minster, Ohio

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Weller Mfg. Co., Chicago, Ill. (storage)

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Browning Co., Cleveland, Ohio.
Haiss Mfg. Co., Inc., Geo., N. Y. City, N. Y.
McMyler Interstate Co., Cleveland, Ohio.
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Williams Co., G. H., Erie, Pa.

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Du Pont de Nemours & Co., Inc., E. I., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio.
Hercules Powder Co., Wilmington, Del.

ENGINES—Steam
Morris Mach. Works, Baldwinsville, N. Y.

ENGINES—Oil
Kahlenberg Bros. Co., Two Rivers, Wis.

ENGINEERS
Arnold & Weigel, Woodville, Ohio.
Artingstall, S. G., Jr., Chicago, Ill.
Austin Co., The, Cleveland, Ohio.
Bacon, Earle C., Inc., New York, N. Y.
Buckbee Co., J. C., Chicago, Ill.
Crow, Waller, Inc., Chicago, Ill.
Ehrsam & Sons Co., J. B., Enterprise, Kans.
Federal Bridge & Structural Steel Co., Waukesha, Wis.
Fuller Engineering Co., Allentown, Pa.
James N. Hatch, Chicago, Ill.
R. W. Hunt & Co., Chicago, Ill.
Randolph-Perkins Co., Chicago, Ill.
Smidth & Co., F. L., New York, N. Y.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Waller Crow, Inc., Chicago, Ill.
Webster Mfg. Co., Chicago, Ill.

EXCAVATORS
Ball Engine Co., Erie, Pa.
Brown Hoisting Machinery Co., Cleveland, O.
Erie Steam Shovel Co., Erie, Pa.
Owen Bucket Co., Cleveland, Ohio.

EXCAVATORS—Dragline Cableway
Link-Belt Co., Chicago, Ill.
Sauerman Bros., Chicago, Ill.

EXPLOSIVES
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Du Pont de Nemours & Co., Inc., E. I., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio.
Hercules Powder Co., Wilmington, Del.

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Ensign-Bickford Co., Simsbury, Conn.

GAS PRODUCERS
Morgan Construction Co., Worcester, Mass.

GEARS
Caldwell, H. W., & Son Co., Chicago, Ill.
Plamondon Mfg. Co., Chicago, Ill.

GENERATORS
Burke Electric Co., Erie, Pa.

(Continued on page 72)

PLAMONDON
TRANSMISSION MACHINERY

Dust Proof Friction Clutches—

The continuous friction surfaces of the Plamondon Disc Type Friction Clutch, consists of but three parts, with all the simple mechanism for adjusting and operating on the outside in plain view.

No part is affected by centrifugal action—they can be run at high speed with safety, and without loss of efficiency. The adjustment for wear is made entirely by means of one adjusting collar, which gives a uniform pressure on all parts of the friction surfaces. These surfaces are absolutely dust proof, and are universally used by leading cement mills.

Our products also consist of Heavy Gearing, Cut Gears and Machine Molded Gears of all kinds—Shafting, Pulleys, Hangers, Couplings, Collars, Pillow Blocks, Worm-Wheels, Fly-Wheels, Rope Sheaves, Grey Iron and Semisteel Castings by analysis.

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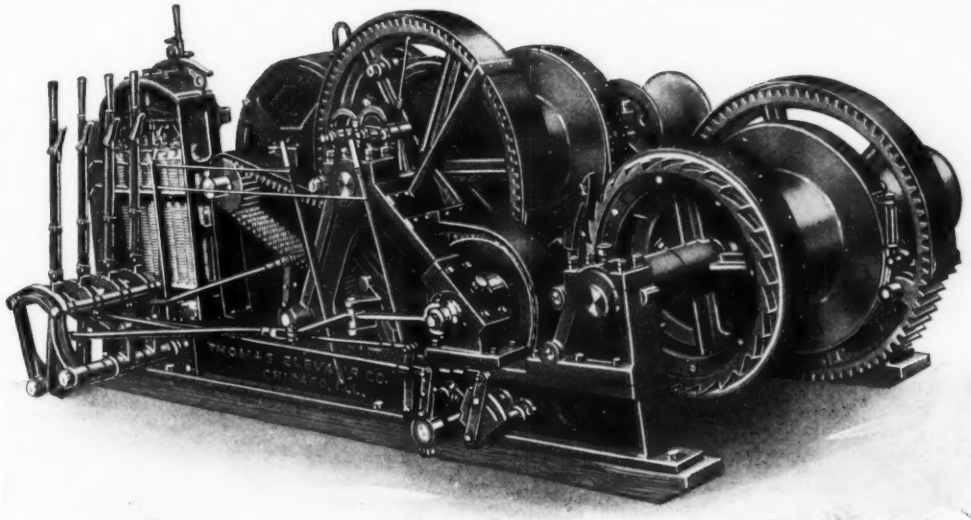
For Dragline Cableway Operation



THOMAS ELEVATOR COMPANY

27 South Hoyne Avenue **Chicago, Ill.**

Buyers' Directory
of the Rock Products Industry
Classified Directory of Advertisers in Rock Products

(Continued from page 70)

GLASS SAND EQUIPMENT
Lewistown Fdy. & Mach. Co., Lewistown, Pa.

GRATES
The Kramer Bros. Fdy. Co., Dayton, Ohio.

GRINDING MILLS
Munson Mill Machinery Co., Utica, N. Y.

HOISTS
Flory Mfg. Co., S., Bangor, Pa.
Thomas Elevator Co., Chicago, Ill.
Vulcan Iron Works, Wilkes-Barre, Pa.
Weller Mfg. Co., Chicago, Ill.

HOSE—Water, Steam, Air Drill, Pneumatic Tool
Cincinnati Rubber Mfg. Co., Cincinnati, Ohio.
Ingersoll-Rand Co., New York City.
N. Y. Belting & Packing Co., New York, N. Y.

HYDRATING MACHINERY
Atlas Car & Mfg. Co., Cleveland, Ohio.
Kritzer Co., The, Chicago, Ill.
Miscampbell, H., Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Toepfer & Sons Co., W., Milwaukee, Wis.

HYDRAULIC DREDGES
Morris Machine Works, Baldwinsville, N. Y.

LIME HANDLING EQUIPMENT
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

LIME KILNS
Arnold & Wiegel, Woodville, Ohio.
Glamorgan Pipe & Fdy. Co., Lynchburg, Va.
Vulcan Iron Works, Wilkes-Barre, Pa.

LOADERS AND UNLOADERS
Ball Engine Co., Erie, Pa.
Brown Hoisting Machinery Co., Cleveland, O.
Erie Steam Shovel Co., Erie, Pa.
Haiss Mfg. Co., The Geo., New York City.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Orton & Steinbrenner, Chicago, Ill.

LOCOMOTIVES
Baldwin Locomotive Works, The, Philadelphia, Pa
Brookville Truck & Tractor Co., Brookville, Pa.
Fate-Root-Heath Co., Plymouth, Ohio.
Hadfield-Penfield Steel Co., Bucyrus, Ohio.
Industrial Equip. Co., Minster, Ohio.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Lima Locomotive Works, New York, N. Y.
Porter Co., H. K., Pittsburgh, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.
Whitcomb Co., Geo. D., Rochelle, Ill.

MOTORS, ELECTRIC
Burke Electric Co., Erie, Pa.

MOTOR TRUCKS
Packard Motor Car Co., Detroit, Mich.
Pierce-Arrow Motor Car Co., Buffalo, N. Y.
Traylor Eng. & Mfg. Co., Allentown, Pa.

PACKING—Sheet, Piston, Superheat, Hydraulic
Cincinnati Rubber & Mfg. Co., Cincinnati, Ohio.
N. Y. Belting & Packing Co., New York, N. Y.

PAINT AND COATINGS
Williams, C. K., & Co., Easton, Pa.

PERFORATED METALS
Chicago Perforating Co., Chicago, Ill.
Cross Eng. Co., Carbondale, Pa.
Hendrick Mfg. Co., Carbondale, Pa.

PLASTER MACHINERY
Butterworth & Lowe, Grand Rapids, Mich.
Ehrsam & Sons Co., J. B., Enterprise, Kans.

PORTABLE CONVEYORS
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POWDER
Atlas Powder Co., Wilmington, Del.
Du Pont de Nemours & Co., Inc., E. I., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio.
Hercules Powder Co., Wilmington, Del.

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Caldwell, H. W., & Son Co., Chicago, Ill.
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Allis-Chalmers Mfg. Co., Milwaukee, Wis.
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K. C. Hay Press & Tractor Co., Kansas City, Mo.
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Traylor Eng. & Mfg. Co., Allentown, Pa.

PULLEYS
Weller Mfg. Co., Chicago, Ill.

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Fuller-Lehigh Co., Fullerton, Pa.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.

PUMP VALVES
N. Y. Belting & Packing Co., New York, N. Y.

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Good Roads Mach. Co., Kennett Square, Pa.
Universal Road Mach. Co., Kingston, N. Y.

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American Steel & Wire Co., Chicago, Ill.
Leschen, A., & Sons Co., St. Louis, Mo.

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Richardson Scale Co., Passaic, N. J.

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Green, L. P., Chicago, Ill.
Sauerman Bros., Chicago, Ill.

SCREENS
Chicago Perf. Co., Chicago, Ill.
Cross Eng. Co., Carbondale, Pa.
Good Roads Machinery Co., Kennett Square, Pa.
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Hendrick Mfg. Co., Carbondale, Pa.
Link-Belt Co., Chicago, Ill.
Smith Eng. Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Tyler Co., The, W. S., Cleveland, Ohio.
Universal Road Mach. Co., Kingston, N. Y.
Webster Mfg. Co., Chicago, Ill.
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Tyler Co., The W. S., Cleveland, Ohio.

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Chicago Mining Sheave & Roller Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

SHOVELS—Steam and Electric
Ball Engine Co., Erie, Pa.
Brown Hoisting Machinery Co., Cleveland, O.
Bucyrus Co., South Milwaukee, Wis.
Erie Steam Shovel Co., Erie, Pa.
Orton & Steinbrenner Co., Chicago, Ill.
Osgood Co., The, Marion, Ohio.

SHOVEL REPAIRS—Steam and Electric
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

SLATE WORKING MACHINERY
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Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

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Hendrick Mfg. Co., Carbondale, Pa.

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Neff & Fry, Camden, Ohio

STUCCO FACINGS
Metro-Nite Co., Milwaukee, Wis.
Middlebury Marble Co., Brandon, Vt.
Vermont Milling Products Co., Fair Haven, Vt.

SWITCHES AND FROGS
Central Frog & Switch Co., Cincinnati, Ohio.
Easton Car & Constr. Co., Easton, Pa.

TANKS, STEEL STORAGE
The Blaw-Knox Co., Pittsburgh, Pa.
Traylor Eng. & Mfg. Co., Allentown, Pa.

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Tyler Co., The W. S., Cleveland, Ohio.

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Williamsport Wire Rope Co., Williamsport, Pa.

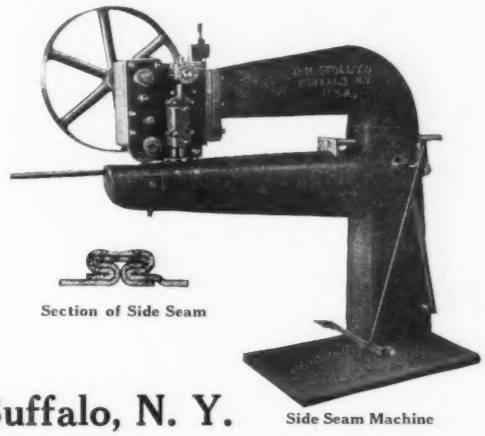
WIRE CLOTH
Cleveland Wire Cloth Co., Cleveland, Ohio.
Tyler Co., The W. S., Cleveland, Ohio.

MAKE YOUR STEEL BARRELS

We say "make them" because it is economical and practical to equip and operate a steel barrel department even when your output is as low as fifty barrels of lime per day.

"Stoll" equipment is in use by practically all the largest chemical companies in the country, and the fact that these companies manufacture at least 15,000,000 steel containers each year, is a convincing demonstration of their efficiency and economy.

"Stoll" equipment manufactures steel barrels that are atmospheric proof without soldering or welding. They will deliver your product to the dealer or builder in excellent condition, and even though the container may be slightly higher in cost than a wood barrel, you will find your customers willing to pay the trifling difference because the material will remain in good shape even under the most trying conditions.

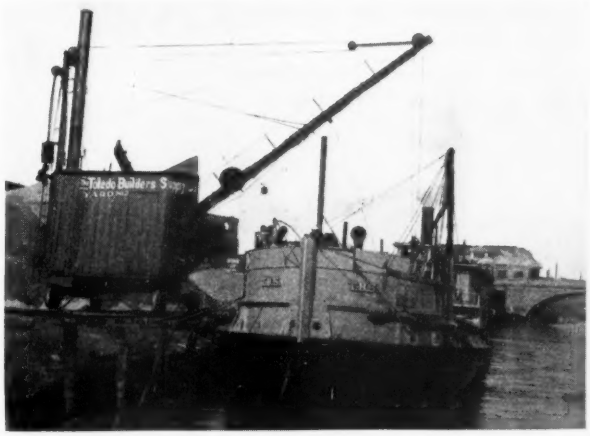


Section of Side Seam

Side Seam Machine

Let us show you how this equipment will save money for you

THE D. H. STOLL CO., Inc. Buffalo, N. Y.



AMSCO

Sand and Gravel PUMPS

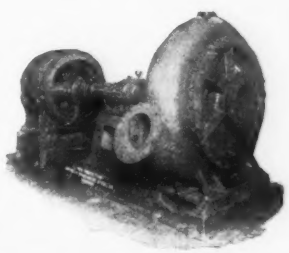
When your plant is equipped with an Amsco Sand and Gravel Pump you have these essential advantages—efficiency, economy and freedom from trouble.

Any centrifugal pump will deliver material for a certain period, but only the Amsco can maintain a standard of satisfaction that demands this expression.

Mr. C. E. Kuhlman, Secretary of the Toledo Builders Supply Company said:

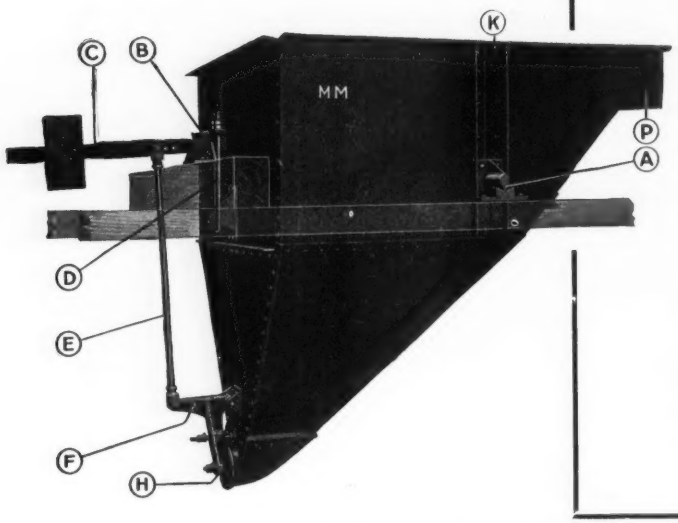
"With reference to American Manganese Steel parts which you have furnished us from time to time for our 10" pumps used on our sand suckers, wish to advise that, without exception, these parts have given very satisfactory service.

"We find that the long life of these parts made from Manganese Steel are great factors in reducing our cost of production, when you consider the delays due to breakdowns and replacements, and the consequent loss of time and production when other parts are used. American Manganese Steel Pump Parts have given us such satisfaction that at the present time we would not think of using any other."



AMERICAN MANGANESE STEEL CO.
CHICAGO HEIGHTS - - ILLINOIS

Telsmith Sand Tank



The Telsmith Sand Tank and its counterweight-arm are both carried on knife-edge bearings, with a wide range of adjustment. As the tank pivots one way, the valve plate pivots in the OPPOSITE DIRECTION, giving ample discharge area with a short, snappy valve action. The swing of both members is limited by an adjustable stop, so that the sand is discharged in SMALL QUANTITIES but at FREQUENT INTERVALS, assuring a deep sand-bed and a dry product.

This tank works automatically and reliably, with only ordinary inspection service. Here's a chance to cut your pay-roll by one man. Send for bulletin No. S-T-11.

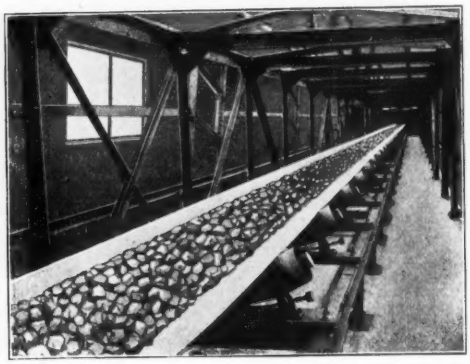
SMITH ENGINEERING WORKS 3188 LOCUST ST.
MILWAUKEE, WISCONSIN

CONVEYING MACHINERY

FOR HANDLING

Cement, Coal, Fertilizer, Gravel, Gypsum, Lime, Phosphate, Sand, Crushed Stone, etc.

WILL INCREASE THE OUTPUT AND CUT YOUR EXPENSES



WELLER MADE CHICAGO

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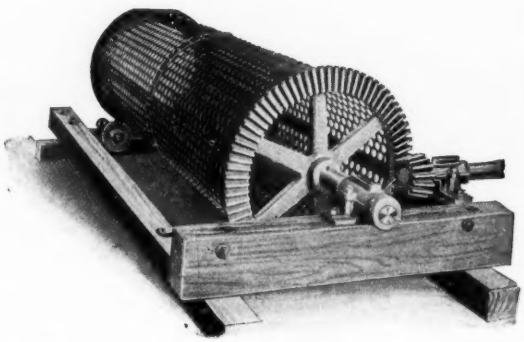

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Apron Conveyors	Spiral Conveyors	Steel Storage Bins	Screens
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1820-1856 North Kostner Avenue **Chicago, Illinois**

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You'll find plenty of new ones, short cuts and time savers in ROCK PRODUCTS.

Our traveling editors are running around, dropping in here and there finding out just how things are done, and then they tell you how the other fellow makes things hum.

Practical stuff—tested ideas—something *you* can use
Better fill out the blank and mail it to us today

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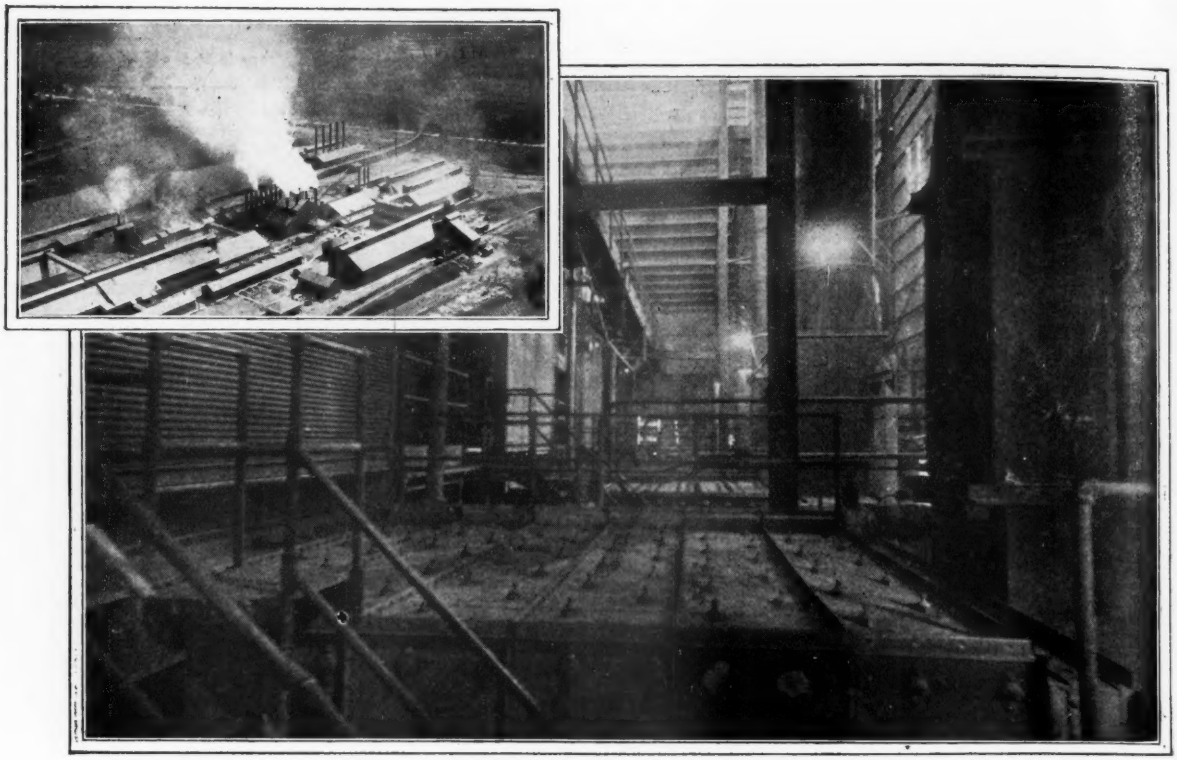

Above: 6,000-barrel plant of the Northwestern States Portland Cement, Mason City, Iowa.

Below: View of Edge Moor Waste Heat System, showing boilers, economizers, and stacks.

Waste Heat Carries the Entire Power Load in this 6,000-Barrel Plant

CEMENT mill operators may well profit by the experience of the Northwestern States Portland Cement Company, whose splendid plant at Mason City, Iowa, is described in the editorial section of this issue.

The entire power load of this plant, with its 6,000-barrel daily capacity, is carried by steam generated from waste heat, thus effecting a tremendous saving in fuel costs. Approximately 125,000 lbs. of steam per hour are generated.

Four Edge Moor Waste Heat Boilers of 933 H. P. each, together with special Green Fuel Economizers, Foster Super Heaters, motor-driven fans and other auxiliary equipment, comprise the Edge Moor Waste Heat System at this plant.

Although this System has been in use only since March, 1921, the greater part of its cost has already been absorbed by the savings it has effected.

Let us tell you how you, too, can reduce expenses and increase capacity with the Edge Moor Waste Heat System.

EDGE MOOR IRON COMPANY
Established 1868
EDGE MOOR, DELAWARE

New York *Boston*
Chicago *Pittsburgh*
St. Paul *Charlotte*

EDGE MOOR Water Tube BOILERS

FOR INCREASED FUEL ECONOMY

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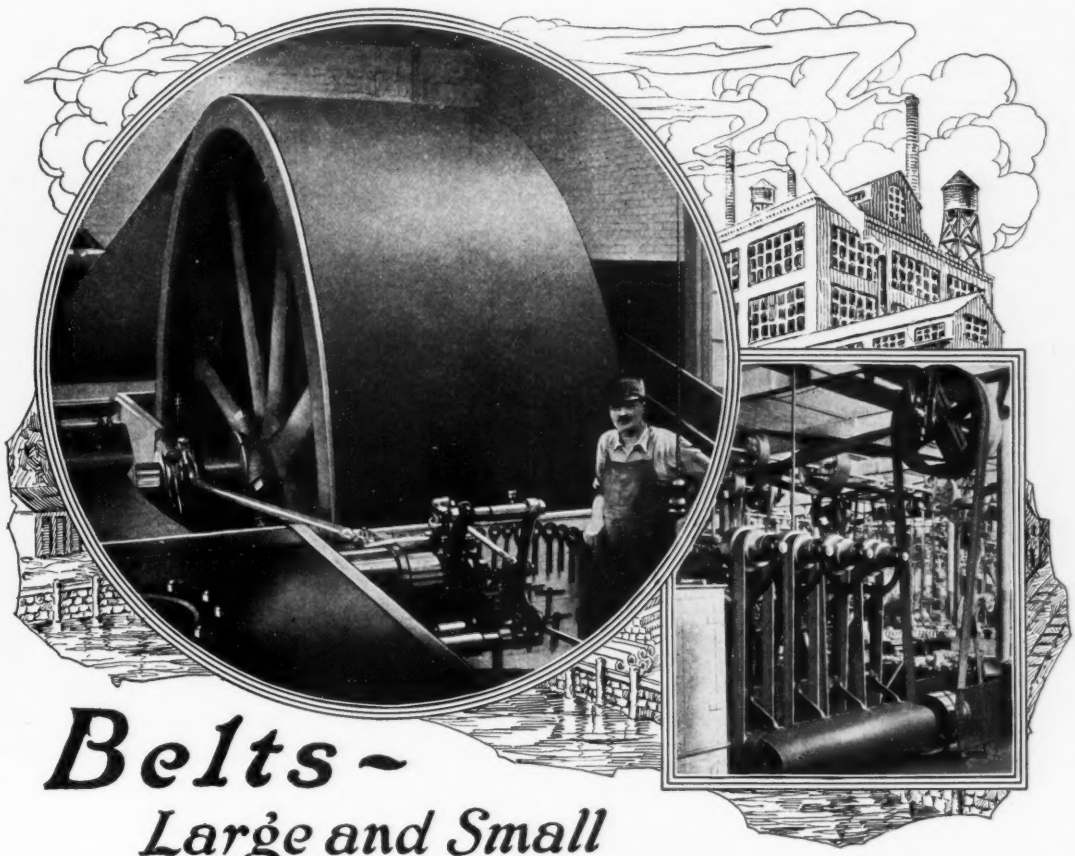

Belts ~ Large and Small

The large belt shown above is on the main drive of Bryant Paper Company, Kalamazoo, Mich. Width, 60 inches—10 ply; Driver Pulley; 16 ft. diameter; Driven Pulley, 8 1/2 ft. diameter; Belt Speed, 3920 ft. per minute; Horse Power, 700.

The insert shows the machine shop of Reo Motor Car Company, Lansing, Mich., equipped throughout with Test Special Rubber Belting.

When you realize how Test Special Rubber Belting is made—the quality and craftsmanship that go into it—it is not surprising that the two installations shown herein are giving such unusual service.

Such endurance in a rubber belt is largely a question of the kind of cotton duck and rubber friction used in its construction, plus skill in manufacture. Weight of duck does not necessarily indicate its adaptability for belting use; it must have strength and flexibility. Only duck having these essentials is used in Test Special, the plies of which are bonded with a rubber friction that not only shows up strong in a sample but retains its adhesiveness under the stress of long, hard service.

These basic elements are combined by skilled artisans to make Test Special Rubber Belting the most durable and economical means of power transmission.

Reap the benefits of this money saving proposition by putting Test Special Rubber Belting to work for you, now.

NEW YORK BELTING & PACKING CO.

New York Boston Chicago Philadelphia
Pittsburgh St. Louis Salt Lake City San Francisco

TEST SPECIAL RUBBER BELTING

STRENGTH – SERVICE – ECONOMY